ELECTRICAL REVIEW

FRIDAY
5 SEPTEMBER 1958

WEEKLY
PRICE 1s 6d

him

Osram

THE WONDERFUL LAMP

Cablemaking today
is largely a matter
of research, experience,
materials, and methods
of quality control—
many of which we have
pioneered ourselves.
But the core of a cable
is copper wire.
So we start with
a further advantage . . .
even the copper is refined
and drawn
under our own control.

BICC | Cablemakers - from start to finish !

BRITISH INSULATED CALLENDER'S CABLES LIMITED, 21 BLOOMSBURY ST., LONDON, W.C.1

Heatrae of Norwich

The HEATRAE F.B. cistern type auto-control Electric Water Heater available in a range of sizes up to 30 gallons capacity.

Write for free literature

A full range of Domestic and Industrial Water Heaters in all sizes up to 125 gallons capacity also available.

Manufacturers of Electric Water Heaters, Oil Heaters, Immersion Heaters, Urns, Towel Rails, Airing Cupboard Heaters, Electric Fires, Flameproof Heating Apparatus, Food Trolleys, Warming Plates, Air Heaters. Specialists in Steam Heated Oil Heaters and Calorifizers for Shipboard.

HEATRAE LIMITED

Pioneers since 1920 in all-electric water heaters

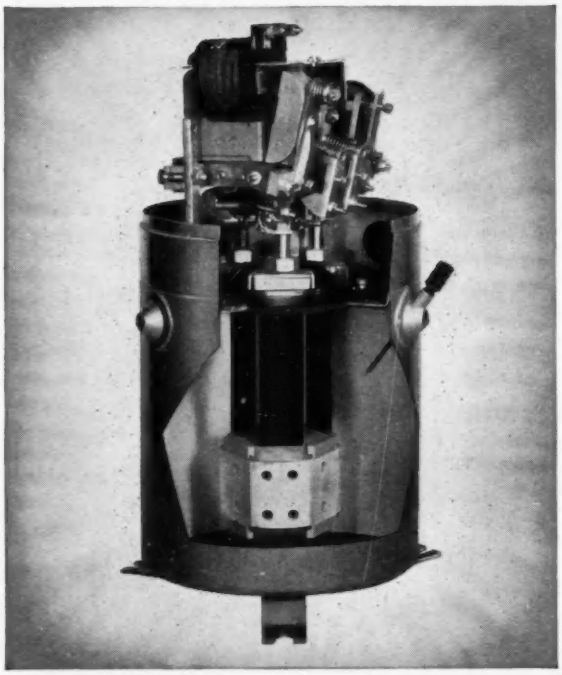
NORWICH - ENGLAND

Telegrams: HEATRAE • NORWICH Telephone: NORWICH 25131 (Private Exchange)

A REVOLUTION !

in the starting of slip-ring motors

THE Vapormatic



offers

★ **AUTOMATIC CONTROL AT THE SAME PRICE AS A HAND OPERATED STARTER.**

★ **EXTENDED MOTOR LIFE due to smooth acceleration and automatic regulation of Rotor Current for all starting conditions.**

★ **STANDARDISATION — Unit capacity up to 40 H.P. Above 40 H.P. identical units are connected in parallel.**

★ **LOW MAINTENANCE — Robust and simple design with no moving parts, ensures trouble free service.**

★ **SPACE SAVING — Less than half size of normal Rotor Starter.**

★ **DELIVERY EX STOCK — for complete starters or Rotor Starters only.**

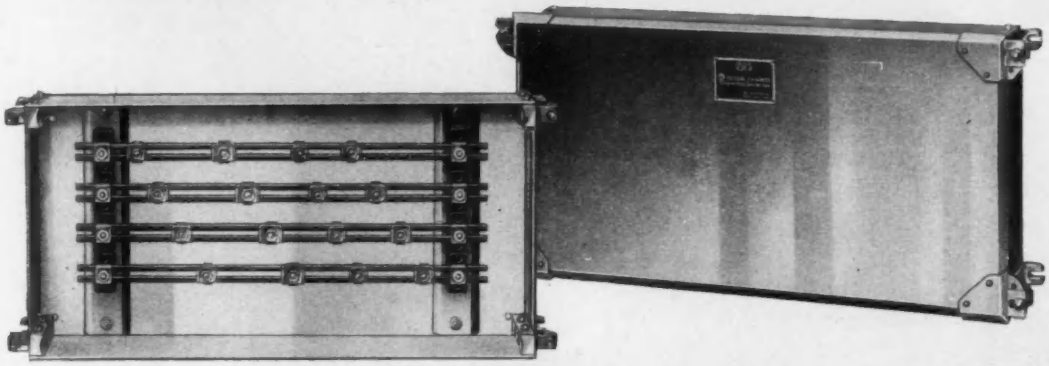
LEE GUINNESS LIMITED

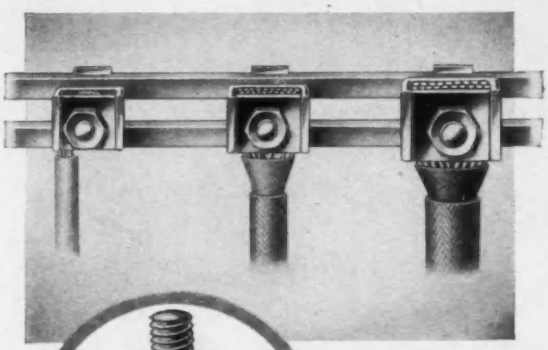
NEWTOWNARDS, NORTHERN IRELAND.

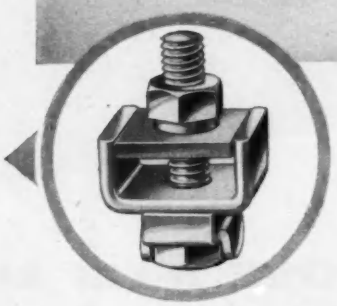
MANUFACTURERS OF A FULL RANGE OF ASEA LICENSED CONTACTOR GEAR FOR ALL DUTIES.

LGV.1

MINIBAR BUSBAR CHAMBERS







- THE EASY AND EFFICIENT BILL SYSTEM FOR LINKING UP FEEDERS ON SMALL DISTRIBUTION SYSTEMS.
- 100 AMPERE BUSBARS IN FIVE STANDARD LENGTHS. 12 ins. TO 36 ins. IN TWO, THREE, OR FOUR BAR SIZES.
- BILL SLIDING CABLE CLAMPS QUICKLY FITTED WITHOUT DRILLING.
- BILL QUICK WIRING CLAMPS CAN BE INSTANTLY MOVED TO ANY POSITION ALONG THE BUSBARS.
- ALL STANDARD SIZES AVAILABLE EX STOCK.

SEND NOW FOR PRICE LEAFLET — MB 657.

You cannot buy better gear

BILL SWITCHGEAR LTD.
ASTON LANE · PERRY BARR
BIRMINGHAM·20

LONDON, S.W.1 A. W. ZELLEY, N. PAYNE, GILLINGHAM ST.
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CHOOSE MEM AUTO-MEMOTA

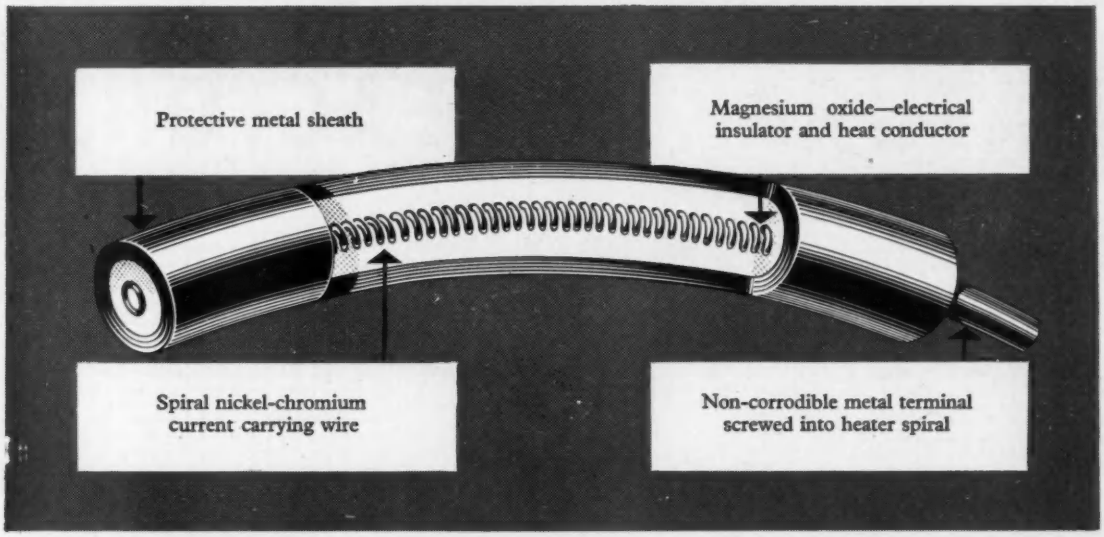
the starter that's been proved all over the world

A HUGE TOTAL of Auto-Memota starters is now in service in all kinds of industries all over the world. The Auto-Memota has proved its ability to protect electric motors on even the most vital duties. Fitted with indirectly heated thermal overload trip on each phase and inherent no-volt release. Made in direct and star-delta types for motors up to 15 HP.

MEM MIDLAND ELECTRIC MANUFACTURING COMPANY LIMITED · TYSELEY · BIRMINGHAM 11

Electric Heating Elements

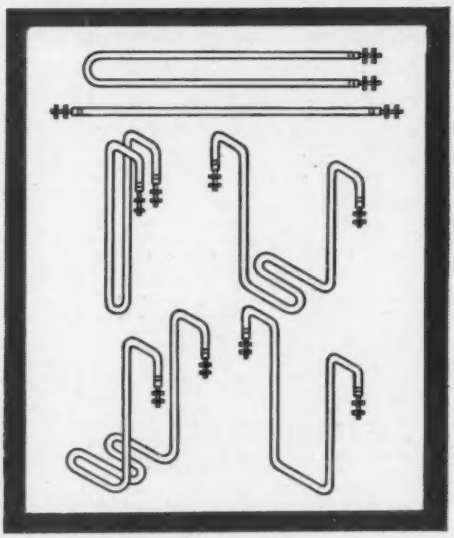
BTH INDUSTRIAL 'PYROBAR'


Protective metal sheath
Magnesium oxide—electrical insulator and heat conductor
Spiral nickel-chromium current carrying wire
Non-corrodible metal terminal screwed into heater spiral

Section of Pyrobar Element

BTH metallic-sheathed resistance heating elements are designed by specialist engineers, and built of the finest materials to ensure long life and trouble-free service.

The elements are avaliable in two standard diameters—$\frac{5}{16}$ in. or $\frac{1}{2}$ in. (nominal)—with either tinned copper, mild steel, Alumbro, Inconel, or stainless steel sheathing. *Continuous* lengths can be supplied on early delivery, up to a maximum of twenty feet dependent upon diameter and sheathing material. PLEASE WRITE FOR LEAFLET



A few examples of the many shapes into which Pyrobar heating elements can be formed

"Remember Wings Day, September 20th, and give generously for those who gave"

BRITISH THOMSON-HOUSTON

THE BRITISH THOMSON-HOUSTON COMPANY LIMITED • RUGBY • ENGLAND

an A.E.I. Company

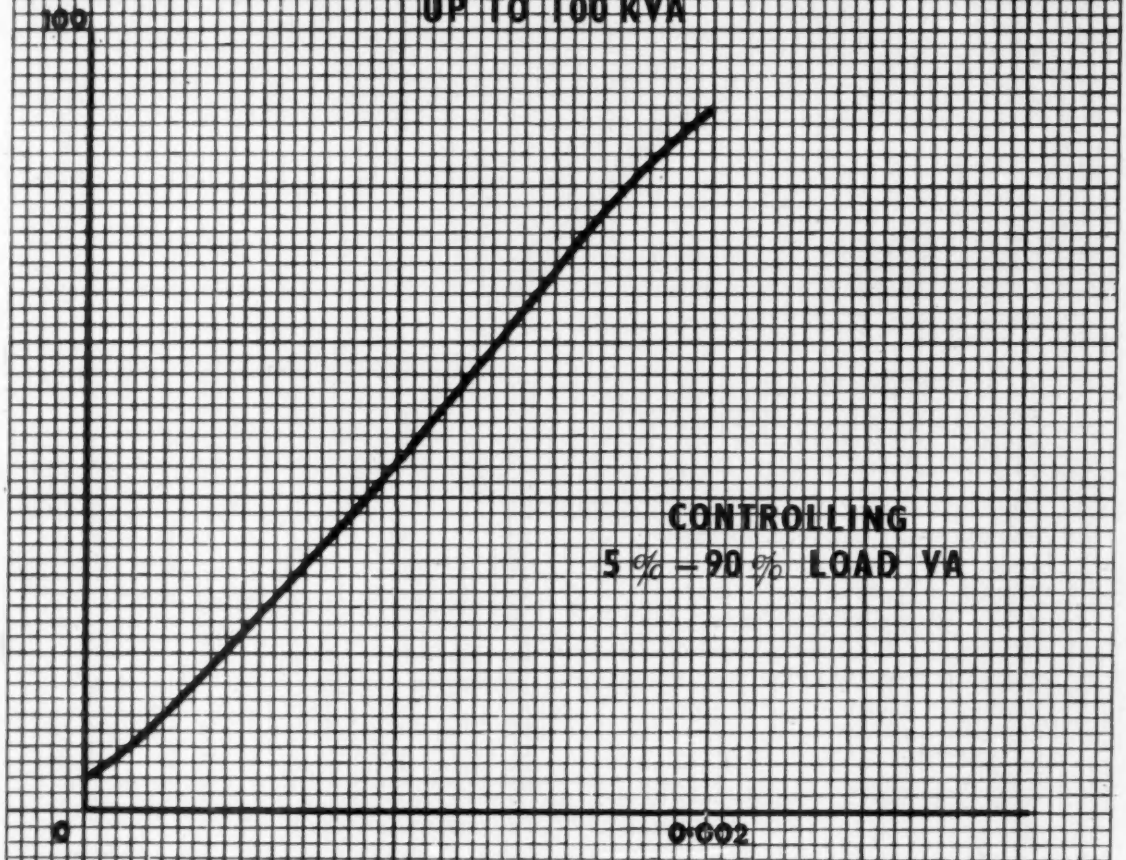
A527E

HADDON

TRANSFORMERS LTD

SATURABLE REACTORS

UP TO 100 KVA



MASONS AVENUE · WEALDSTONE · HARROW · MIDDLESEX

Telephones: HARROW 9022/5 Telegrams: HADTRANS HARROW

Everything has to be

CONTROLLED

your foot on the accelerator,

your oil pressure,

your blood pressure . . .

and did you say . . .

your girl friend?

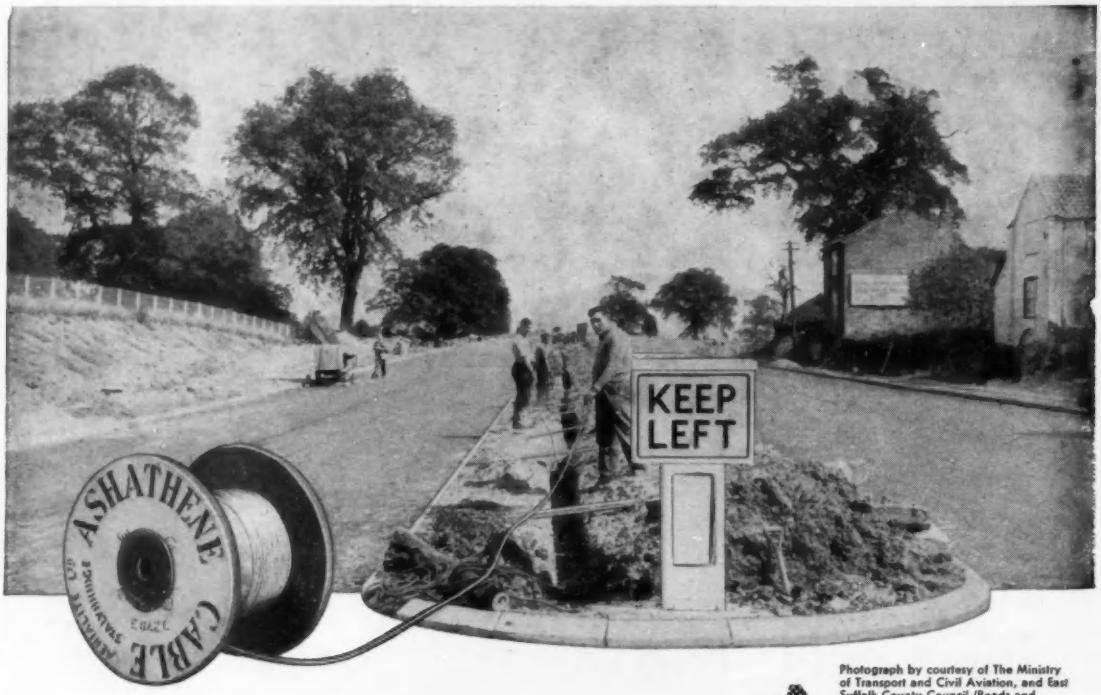
but . . .

to control electricity

SANDERS

The mark of superiority in Switch and Fusegear.

WM. SANDERS & CO. (WEDNESBURY) LTD.
FALCON ELECTRICAL WORKS,
WEDNESBURY, STAFFS.



Photograph by courtesy of The Ministry of Transport and Civil Aviation, and East Suffolk County Council (Roads and Bridges Dept.)

ASHATHENE *on the Highway*

Chosen to supply the "Keep Left" signs on the important Highway A12,

AERIALITE ARMOURED ASHATHENE CABLES

are being installed on the Washbrook section of the Colchester/Ipswich dual carriageway by the contractors May, Gurney & Co. Ltd.

Ashathene P.V.C. sheathed and armoured cables have the widest application in industry, in mines and for general purposes where toughness, strength and reliability are of major importance.

These cables are supplied with polythene or P.V.C. insulation, with single or double wire armour and conform to B.S.1557 or B.S.2004 (as far as applicable).

Full details on request.

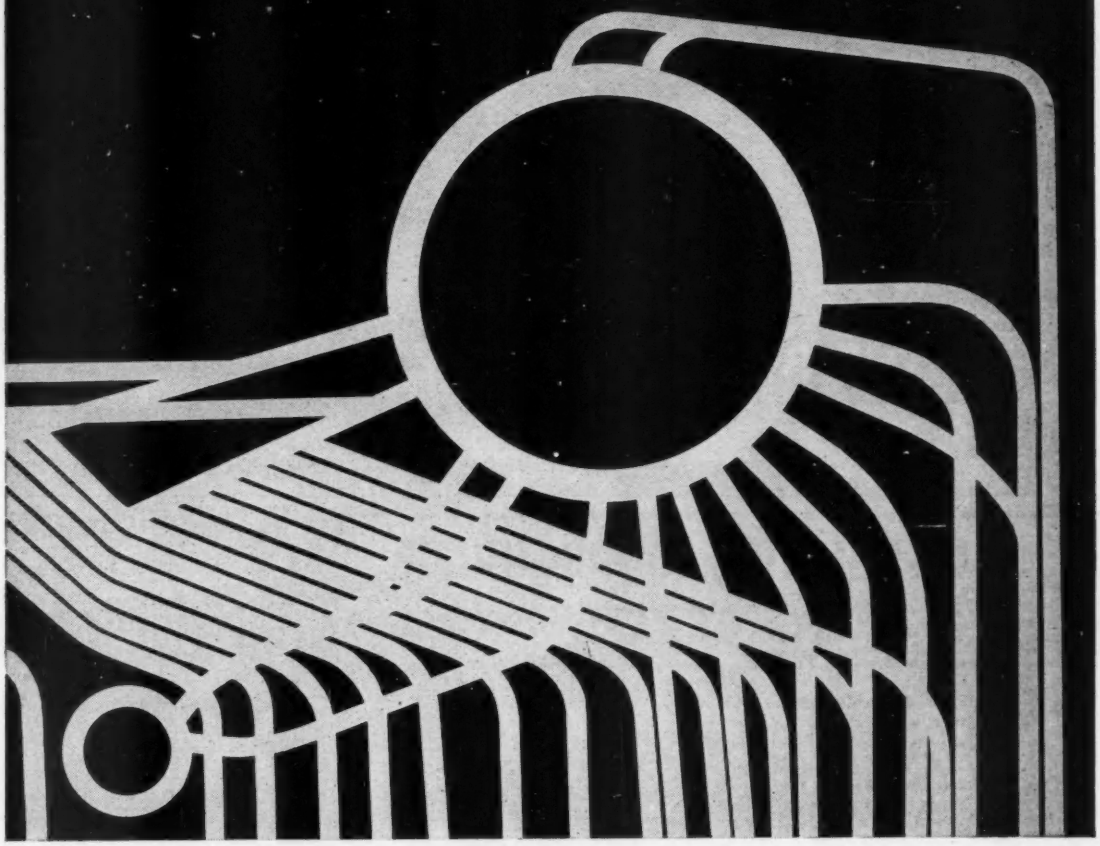
Aerialite LIMITED

Head Office and Cable Division: Castle Works, Stalybridge. Tel.: Stalybridge 2223/8.

DEPOTS AT London, Birmingham, Bristol
Manchester, Newcastle, Glasgow

CW 4790

water-tube boilers



We build water-tube boilers of Foster Wheeler designs for outputs between 20,000 and 1,000,000 lb. per hour at steam conditions up to 2,350 p.s.i.g., 1,050°F, with or without re-heat, fired by liquid, solid or gaseous fuel. They are generously designed to maintain high efficiency over prolonged steaming periods.

R W G

Richardsons Westgarth (Hartlepool) Ltd

A member of the RICHARDSONS WESTGARTH GROUP which co-ordinates the land and marine activities of:

THE NORTH EASTERN MARINE ENGINEERING CO. LTD.
PARSONS MARINE TURBINE CO. LTD.
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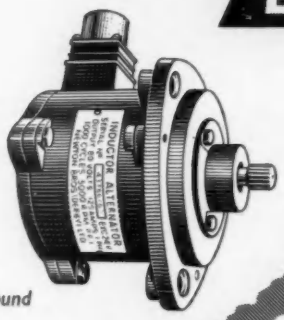
THE HUMBER GRAVING DOCK & ENGINEERING CO. LTD.
RICHARDSONS WESTGARTH ATOMIC LTD.

ASSOCIATED COMPANY: ATOMIC POWER CONSTRUCTIONS LTD.

RICHARDSONS WESTGARTH (HARTLEPOOL) LTD., HARTLEPOOL, CO. DURHAM AND AT 58 VICTORIA ST., LONDON, S.W.1

ELECTRICAL EQUIPMENT



10/20 VA 1000 c.p.s., 1 phase, 3000 r.p.m. wound field or permanent magnet excitation

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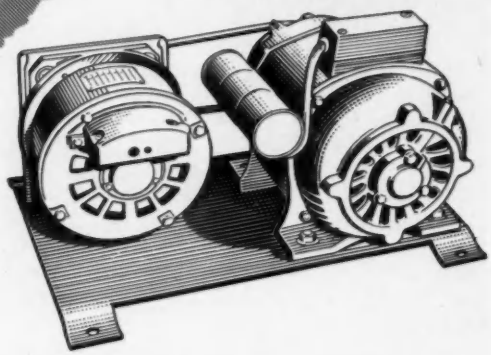
WINGS DAY SEPT. 20th GIVE FOR THOSE WHO GAVE

High Frequency Motor Alternator Set. 1kVA, 115 volts, 1600 c.p.s., single phase



NEWTON DERBY

NEWTON BROTHERS (DERBY) LIMITED

ALFRETON ROAD · DERBY

PHONE: DERBY 47676 (4 LINES) GRAMS: DYNAMO, DERBY

London Office: IMPERIAL BUILDINGS, 56 KINGSWAY W.C 2

ELECTROLYTIC CONDUCTIVITY CONTROL

The Type RC4 conductivity controller continuously monitors the purity of processed waters, wash and rinse waters, steam condensate, effluent concentration, etc., and operates electrical ancillaries such as magnetic valves, visual or audible signals, when the conductivity reaches a predetermined value.

Series CCA (patented) pipeline measuring cell.

A wide selection of indestructible measuring cells for a variety of conditions are available for use with the control.

Other equipment includes:

PORTABLE CONDUCTIVITY MEASURING BRIDGES AND RECORDERS · LIQUID AND SOLIDS LEVEL CONTROLS PROCESS TIMERS · PHOTOELECTRIC CONTROLS REGISTRATION CONTROLS FOR PACKAGING · ELECTRONIC COUNTERS AND BATCHERS, ETC.

Type RC4 conductivity controller.

Descriptive leaflets RC4 and CC available upon request.

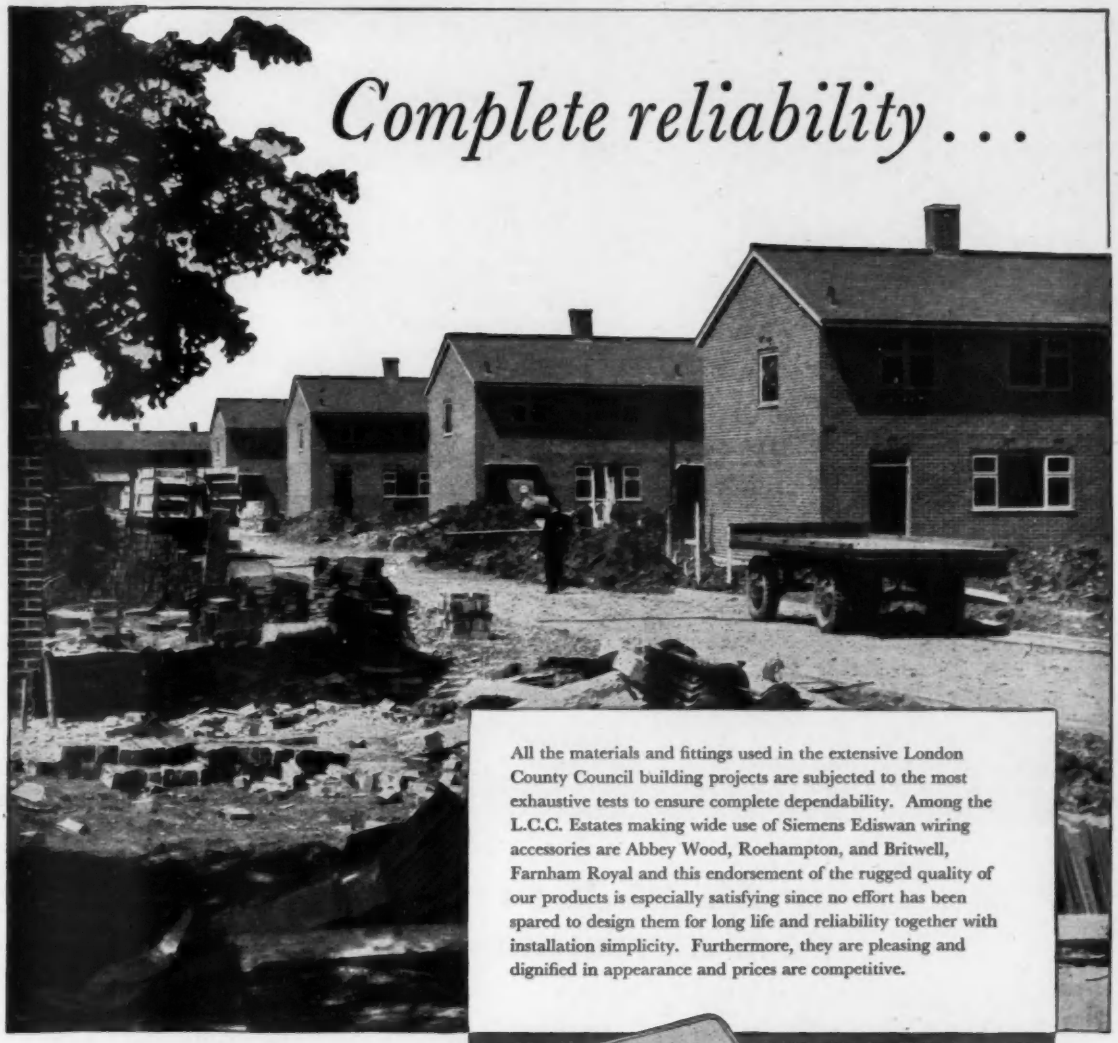
ELECTRONIC SWITCHGEAR (LONDON) LTD.

WORKS ROAD · LETCHWORTH · HERTS

Telephone: Letchworth 1853

London Office:
47 Victoria Street, Westminster, S.W.1
Telephone: ABBey 2771/5

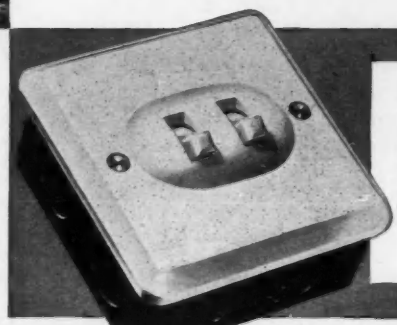
Complete reliability . . .



All the materials and fittings used in the extensive London County Council building projects are subjected to the most exhaustive tests to ensure complete dependability. Among the L.C.C. Estates making wide use of Siemens Ediswan wiring accessories are Abbey Wood, Roehampton, and Britwell, Farnham Royal and this endorsement of the rugged quality of our products is especially satisfying since no effort has been spared to design them for long life and reliability together with installation simplicity. Furthermore, they are pleasing and dignified in appearance and prices are competitive.

Part of the L.C.C. estate at Abbey Wood.

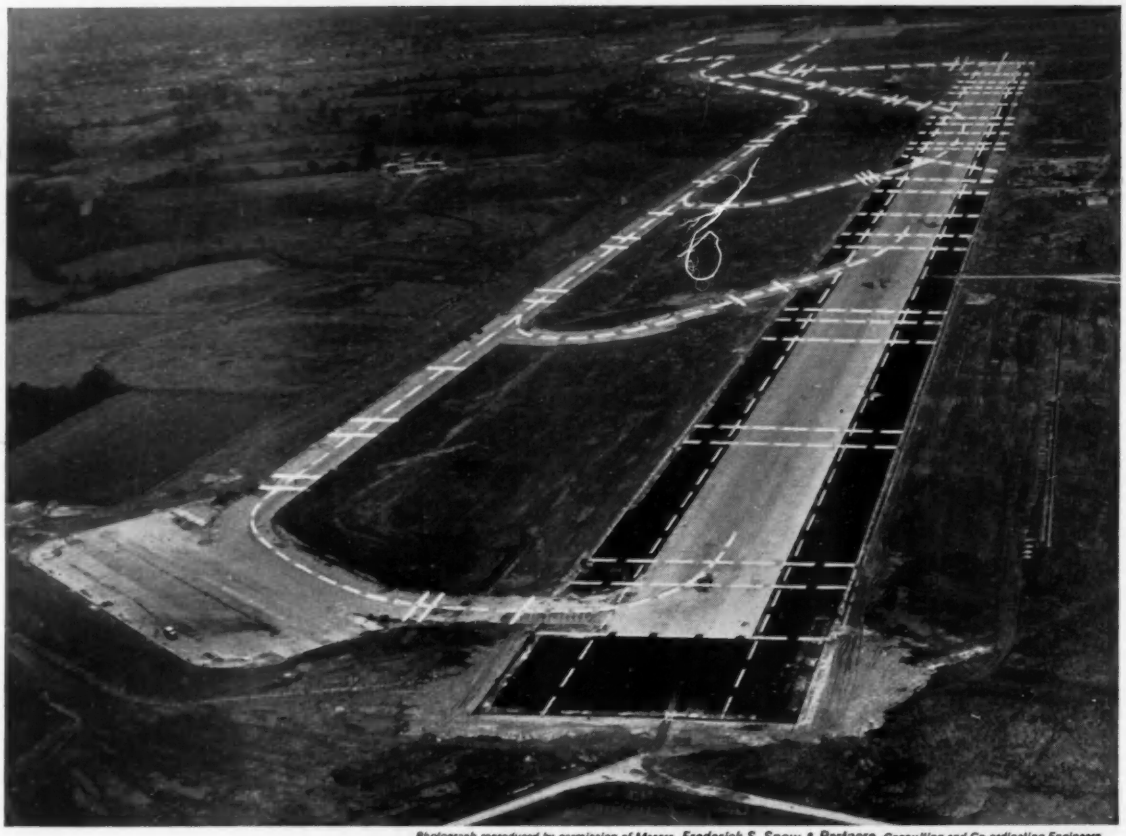
ARCHITECT: Hubert Bennett, Esq., F.R.I.B.A.
ENGINEERING SERVICES: Joseph Rawlinson, C.B.E., M.Eng., M.I.C.E., M.I.Mech.E.
BUILDERS: Unit Construction Co. Ltd., 24 St. James Street, LONDON, S.W.1.
ELECTRICAL CONTRACTORS: Holliday & Sun (Electrical) Ltd., Balham High Road, LONDON, S.W.12.



Siemens Ediswan manufacture a complete range of wiring accessories for all types of housing projects

SIEMENS EDISWAN **Electrical Accessories**

SIEMENS EDISON SWAN LTD. *An A.E.I. Company.*
28-39 UPPER THAMES ST., LONDON, E.C.4. *TELEPHONE: CENTRAL 2332 TELEGRAMS: SIESWAN CENT LONDON*
TAB 11210 P.D 10/3



Photograph reproduced by permission of Messrs. Frederick S. Snow & Partners, *Consulting and Co-ordinating Engineers. Main Contractor: Sir Alfred MacAlpine & Son, Ltd.*

37 MILES OF KEY PITCH FIBRE CONDUIT FOR GATWICK AIRPORT

A 200,000 ft. installation of KEY Pitch Fibre conduit at Gatwick Airport has brought considerable economies and consequent gains in efficiency. Running under the runways as indicated on the photograph by broken white lines, the outstanding resilience of KEY is a major advantage. KEY is the ideal conduit for cable protection; joints are perfect and the surface is smooth; it takes up the smallest space, requires the minimum of concrete surround and is the quickest and cheapest to install. This modern conduit system is used for runway lighting, radar and communication cables, sub-station power cables and many other services throughout the Airport.

Easier and cheaper laying 'Tap-in' joints give faster, all-weather laying. On cost plus labour basis, KEY Pitch Fibre conduit is cheaper per installed foot run than any other conduit system.

No cracking through settlement KEY Pitch Fibre conduit is resilient and even though foundation movement may occur, fracture of the conduit is most unlikely.

Highly resilient in service Will withstand all the exacting conditions of cable service.

Smooth bore — low friction A coefficient of friction as low as 0.30 facilitates cable pulling.

Light and easy to handle Transport, storage and handling costs are greatly reduced.

Sizes and fittings The standard length of light wall conduit is 5 ft. 6 in. for internal diameters of 2 in., 3 in., 3½ in., 4 in., 5 in. and 6 in. Where required, however, 4 in. and 6 in. diameter conduit can be supplied in 8 ft. lengths. Curved conduit, in 3 ft., 6 ft. and 12 ft. bend radii, is available in all diameters.

Fully approved KEY Pitch Fibre conduit is used by principal and local Government authorities both in the U.K. and overseas.

Get to know more about KEY PITCH FIBRE CONDUIT

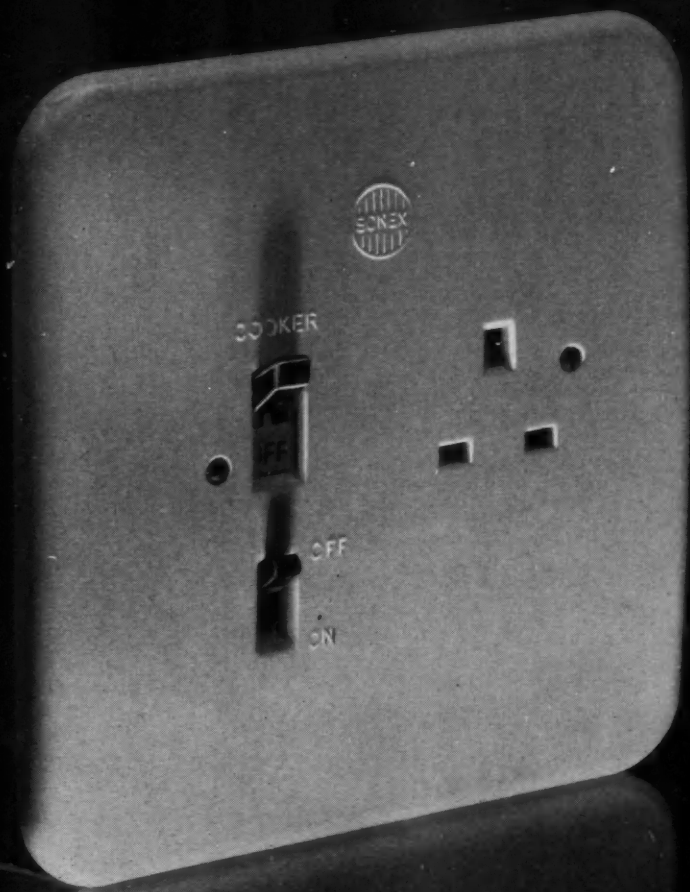
The world's finest conduit at lowest installed cost!

A product of **KEY ENGINEERING COMPANY LIMITED,** Larkfield, near Maidstone, Kent. Tel: Maidstone 7461 and 7233

Reed PATENT CONDUIT

TGA KC1

WYLEX



Sonex
COOKER UNITS

The Preferred Control for Modern Cookers

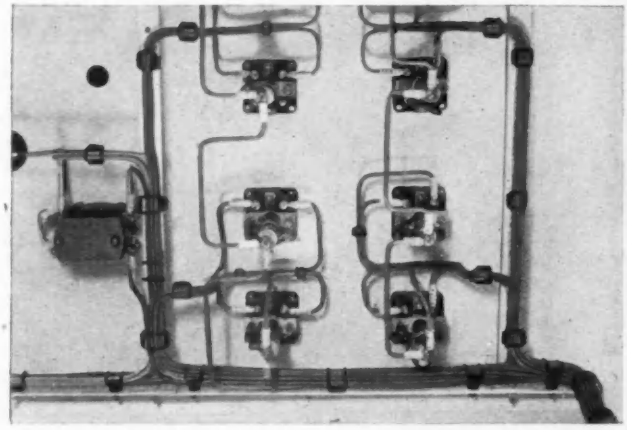
Illustration shows SONEX 780, Flush Metalclad. Ask details of full range.

George H. Scholes & Co. Ltd.,
Wylex Works, Wythenshawe, Manchester, 22.

SAMMY THE SWEEPER-UP says...

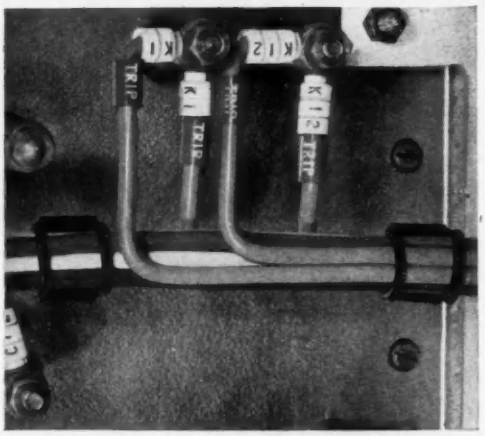
"life's a bloomin' sight easier... nah they're usin' this 'ere Cradleclip..."

"I've been sweeping up wiring trash for more years than I care to remember, but since our firm's switched to Cradleclip keeping the factory floor clean's a pleasure . . . the cubicles don't look like trash cans any more and by gum our wiring's as neat as 9d." Sammy has a point which is often overlooked in switchgear wiring—how much wasted profit is swept into the trash can? . . . none at all when you wire with Cradleclip. The one . . . two . . . and it's done ! slickness of Crableclip gets the wiring done quicker (52%) and better, and Cradleclip's remarkable versatility in conjunction with all its other outstanding features produces greatly beneficial advantages in every stage of switchgear production and wiring contracts.



Photographs by kind permission of South Wales Switchgear Ltd., Blackwood, Monmouthshire.

Section of a Cubicle Control Board, showing CRADLECLIP.



Close-up of CRADLECLIP installation.

JUST LOOK AT THESE CRADLECLIP FEATURES —

- Cuts wiring time by 52% ★
- Combines high speed fixing with simplicity and complete security ★
- Brings a new versatility, compactness and neatness to your wiring ★
- Completely insulated and suitable for all climates ★
- Electrical and mechanical security in all conditions ★
- Proved in wiring installations throughout the world ★

ONE . . . TWO

. . . AND IT'S DONE!

Send for fully descriptive literature on the Insuloid Cradleclip Wiring System now and find out about these other Insuloid products for greater cable fixing security and efficiency —

SAS and AS Adjustable Saddles; NX, X and CY Cable Clips; Ring Lock Bushes; Busbar Insulation with P.V.C. Sleeving; Flexiguard Cubicle-to-Door Cable Trunking.

Insuloid cradleclip

TWICE AS GOOD . . . . TWICE AS QUICK . . . . WHEN YOU WIRE WITH CRADLECLIP!

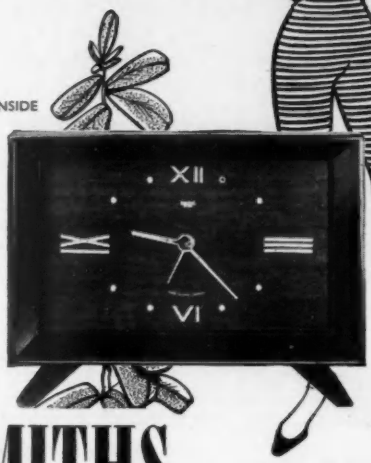
INSULOID MANUFACTURING CO. LTD.

Sharston Works, Leeston Avenue, Wythenshawe, Manchester

Tel: Wythenshawe 2842 & 3163

Accent on the **modern**

NEW 'SECTRIC' CAMPAIGN TO SELL SELECTED RANGE



Smiths autumn-winter campaign for 'Sectric' Clocks in leading National newspapers and magazines goes all out to sell the boon of 'Sectric' timekeeping to busy, modern people everywhere. 'Right without winding or regulating, right for the modern home, right as the unforgettable gift' is the theme. Models from the SELECTED RANGE will be featured boldly. Order full and representative stocks NOW!

SMITHS CLOCK & WATCH DIVISION Sectric House, Waterloo Road, London, N.W.2

GODWIN
AUTOMATIC WATER-SYSTEM
Type J3D

- Same pump for deep or shallow wells.
- Maximum lift 150 ft.
- Maximum capacity 3000 GPH.
- There are no moving parts in Well, and only one moving part in Pump.
- No stuffing box needing periodic attention.
- Designed primarily for FARM, HOUSING SITES and INDUSTRIAL WATER SUPPLIES, etc.

Write for full details from sole manufacturers :

H. J. GODWIN
LIMITED
QUENINGTON
GLOS.
Phone: Coln St. Aldwyns 271 (6 lines)
Grams: Pumps Quenington

GODWIN *Pumps*

TESTED TO 20,000,000 OPERATIONS

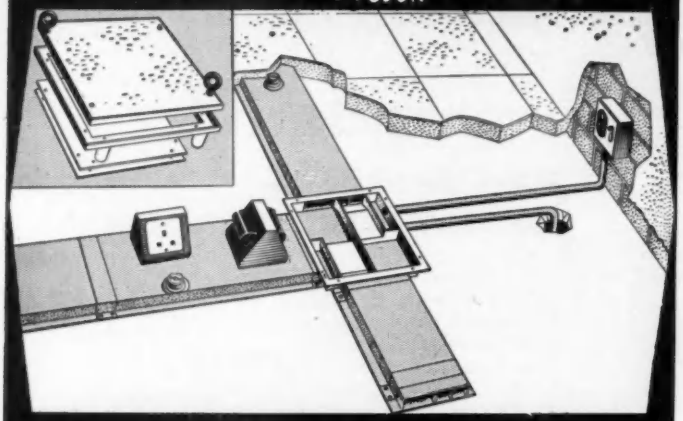
—that's *one* reason for choosing BROOKHIRST Snap Action Limit Switches—well-proved reliability. Other reasons: positive quick make and break changeover contacts, consistently accurate tripping, robust splash-proof or watertight enclosure.

For full information write for Leaflet 2103

BROOKHIRST | SNAP ACTION LIMIT SWITCHES

BROOKHIRST SWITCHGEAR LTD., CHESTER
A METAL INDUSTRIES GROUP COMPANY CVS-62

THE IMPROVED
Greenwood-Airvac UNDER FLOOR Duct System



provides for all cables to be accommodated in one duct with adequate screening between telephone and power cables

LATEST DEVELOPMENTS

- Remote adjustable floor frame in brass with recessed lid to take final floor finish.
- Waterproof Junction Box.
- Ducting fitted with adjustable outlets.
- Universal pedestal unit suitable for Post Office or internal telephones, power and lighting.

Please write for further details and information about the Greenwood Airvac Underfloor and Skirting Duct Systems or call to see the demonstration layouts in the Carlisle House showroom.

Greenwood Airvac Conduits Ltd

Patentees, Designers and Manufacturers of Electrical Conduit Systems
CARLISLE HOUSE, 8 SOUTHAMPTON ROW, LONDON W.C.1 CHAncery 9377 (3 lines) 'Grams: Aircon, Westcent, London

UTILAIR
REGD. TRADE MARK

22 years of progress

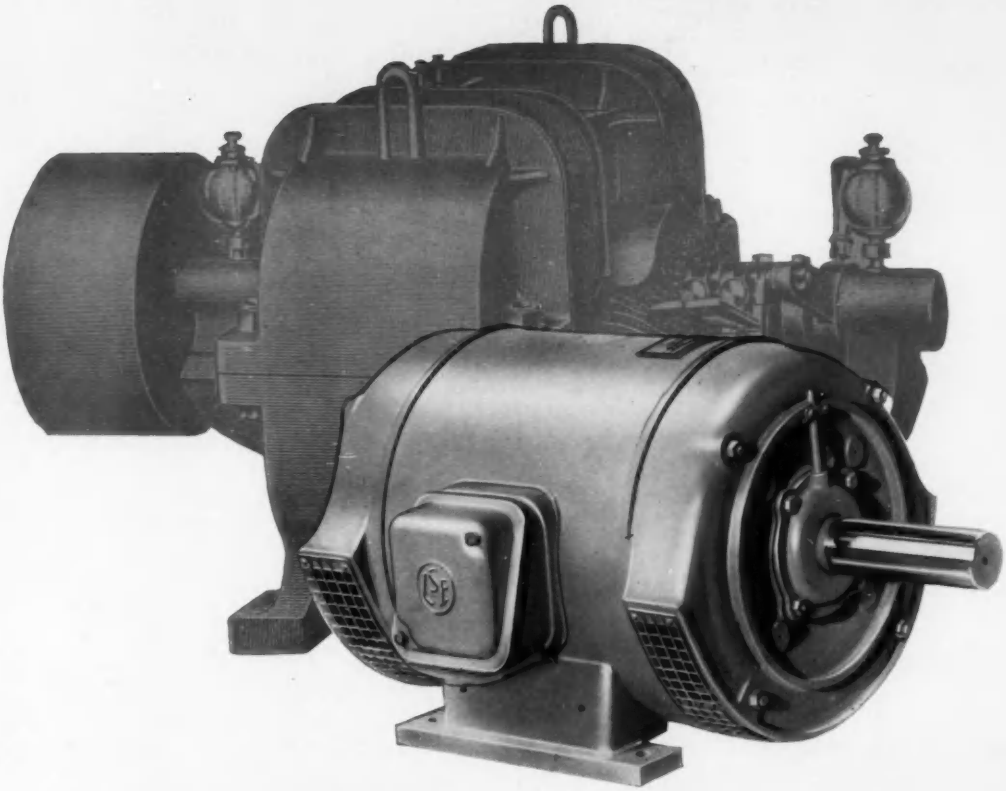
TODAY, after 22 years of Progress, Research and development, expansion has demanded the opening of our new factory at Morden Road, Mitcham, Surrey. Greater manufacturing and storage space will mean that a more comprehensive range of Fluorescent Lighting Fittings and Equipment will be maintained, whilst speedier delivery of urgent requests can be effected.

HEAD OFFICE
TUNSTALL ROAD
BRIXTON · LONDON · SW9

In specifying UTILAIR Authentic Lighting Equipment for any contract, you can be assured that the installation will stand the test of trouble-free operation under all conditions.

We shall be pleased to advise and assist with any special requirements and the services of our Technical Dept. are at all times at your disposal.

UTILITIES (LONDON) LTD.
Manufacturing Electrical Engineers
Telephone: BRIxton 6811-2-3 Telegrams: UTILON, LONDON, S.W.9



SMALL BY DEGREES

(and beautifully less—in all but performance)

When we started in business, a 50 h.p. motor was an impressive piece of machinery. Although not quite as large as a house, it was usually installed in a special room and tended by a single-minded man with an oil can.

In seventy-five years we have gained a lot of design experience and have always been quick to adopt improved manufacturing methods and materials. Much more performance per pound of motor is now available, and our latest, the British Standard Ventilated type, is about one-quarter the weight of the equivalent induction motor of forty years ago and is correspondingly compact in its standardised overall dimensions.

Space costs money, especially when a motor is housed within the frame of the driven machine, and this latest advance marks a real econc my—bearing in mind that it is allied to L.S.E. standards of quality and service.

Prices and details of stock ratings are given in Publication 143, available from any L.S.E. branch or from Publicity Dept., Manfield House, 376 Strand, London, W.C.2. Most ratings are now available in both standard squirrel-cage and Trislot high-torque low-current types.

LAURENCE, SCOTT & ELECTROMOTORS LTD

NORWICH, MANCHESTER, LONDON AND BRANCHES

SPECIALIST MAKERS OF ELECTRIC MOTORS SINCE 1883

A

Johannesburg, Transvaal! At night a fairyland of light, by day a bustling centre of commerce. A busy city, a modern city, a city powered by the G.E.C.

With the latest contract for two 60 MW turbo-generators, the number of G.E.C. sets in Johannesburg's four power stations will total twenty five and will provide three quarters of a million kilowatts. And so the G.E.C. serves Johannesburg with the power to keep a great city alive. A big job indeed—and just the job for the G.E.C. with its vast experience of electrical generation, distribution and control.

G.E.C.

power generation

THE GENERAL ELECTRIC COMPANY LIMITED OF ENGLAND.
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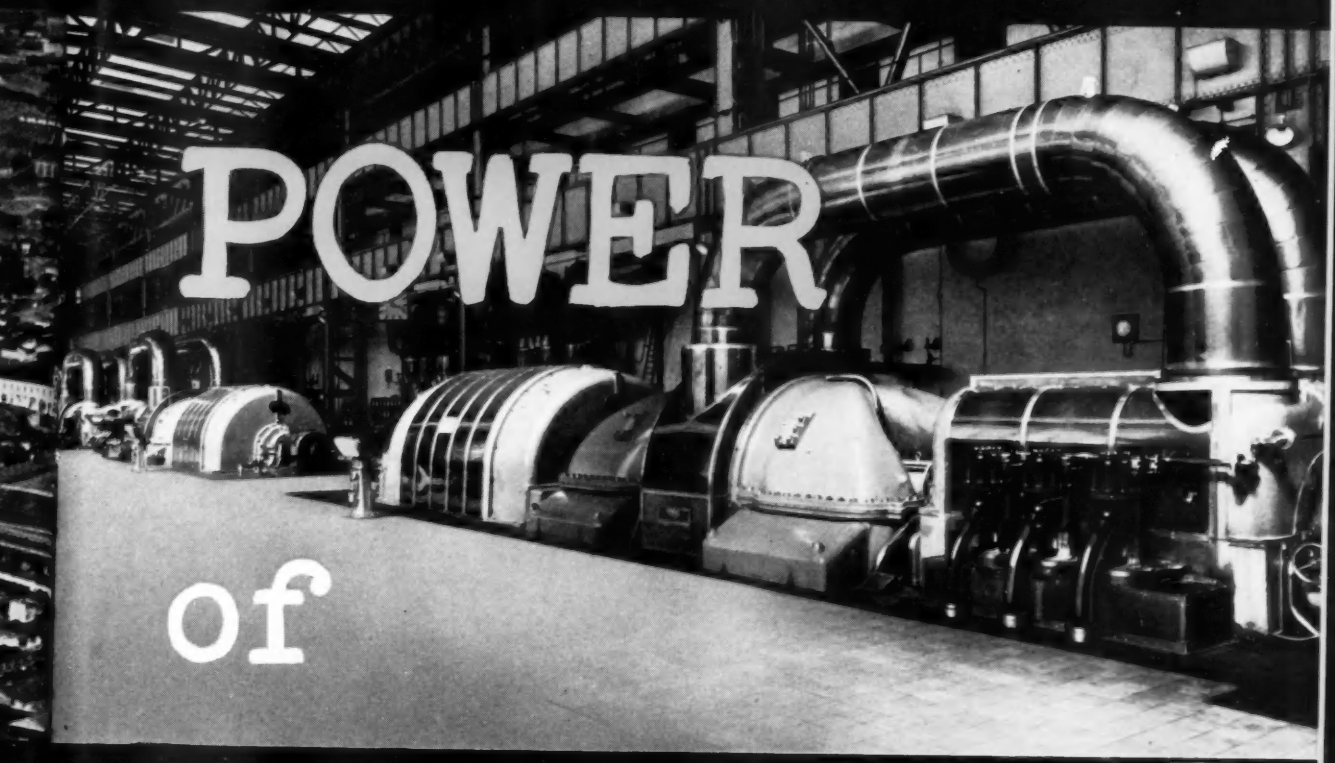
The POWER of Johannesburg



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Sound, planned *lighting makes your premises look more attractive and increases sales!*

And the Philips Lighting Design Service is ready and waiting to plan the right lighting for *you* — without charge or obligation. So let imaginative lighting sell for you, too — get in touch with the Philips Lighting Design Service either direct or through your electrical contractor.

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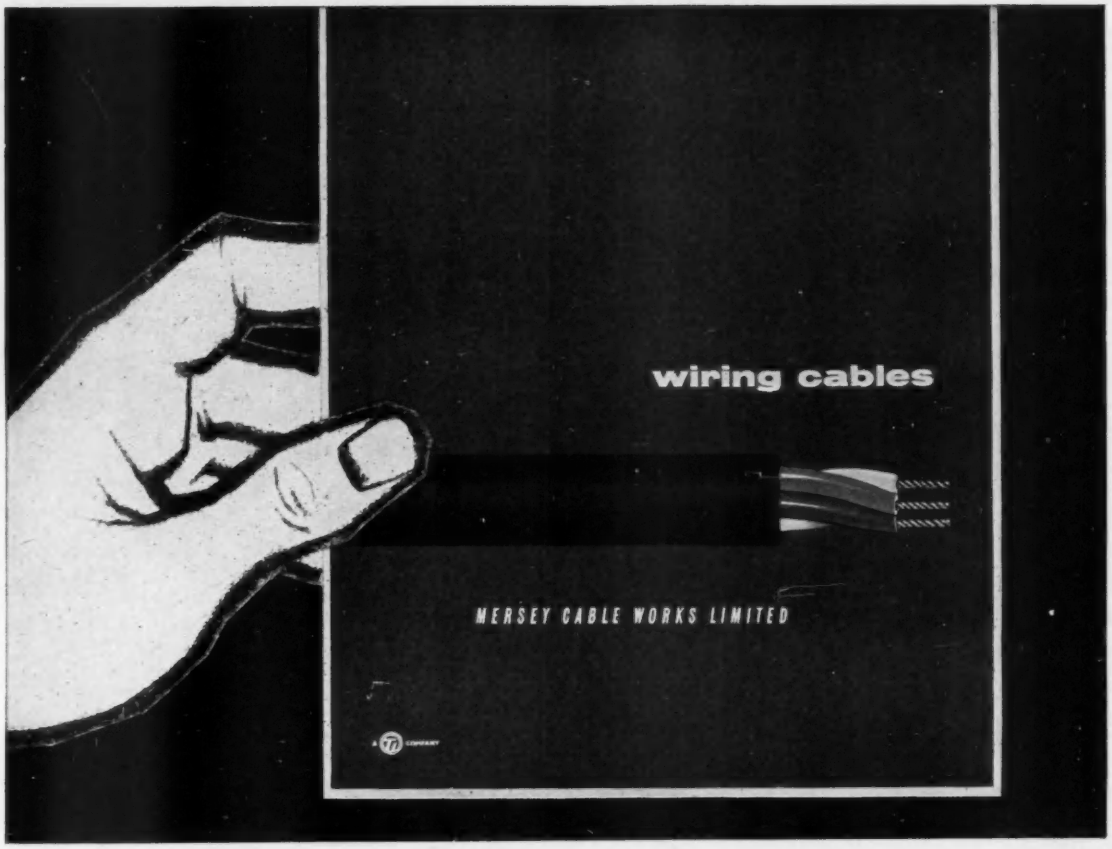

a word to the wiring world

Mersey Cables offer to those in the world of wiring this new and altogether outstanding Wiring Cables Catalogue.

All the cables listed conform to British Standard Specifications for Vulcanised Rubber, P.V.C. and Polythene insulation.

Also included in this work is a Technical Data section which gives the capacity of conduits and current ratings.

Please request Publication No. A 101, whereupon a copy will be despatched to you promptly and entirely free of cost.

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MCW10a

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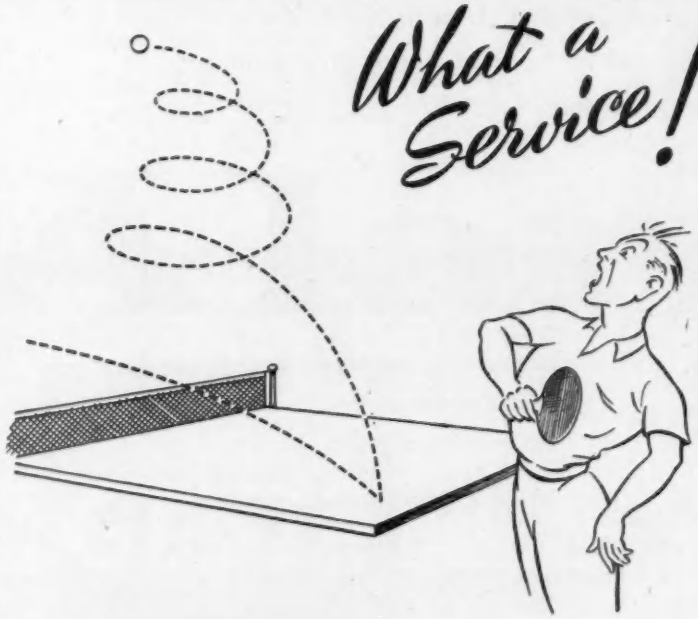

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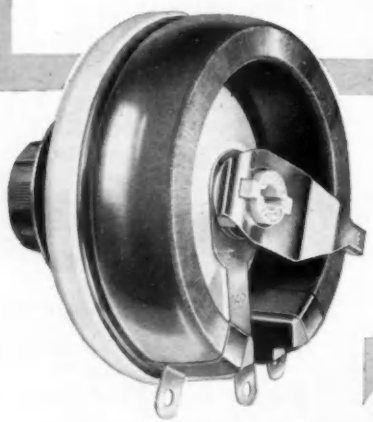
It's a bit of a mouthful but you need only say it once preceded by the name 'Cressall'. Whether you require the vitreous enamelled Cressall "Torostat" (illustrated below) of extremely robust ceramic unit construction or the well known open-wound type of rheostat or potentiometer, you will find none better than Cressall.



Forty years' experience in design and manufacture ensure that each Cressall product has extra quality inbuilt.

Write for Catalogue Section D, List 63.

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Contractors—this is **your** business! **Profitable business** can be obtained by installing Gents' Fire Alarm Systems. Efficient, reliable and economical, simple systems are easily installed which comply with the Factory Act. Where necessary the free services of our Technical experts are available for surveying the premises.

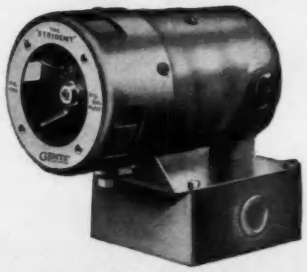
Typical Fire Alarm Contact

Specially designed as a neat, small Fire Alarm Point, with precious metal contacts and substantial springs for **complete** reliability even after years of installation. Each contact will operate a maximum of 3 Strident syrens on 200/250v AC.

PRICE £2. 10s. 0d.

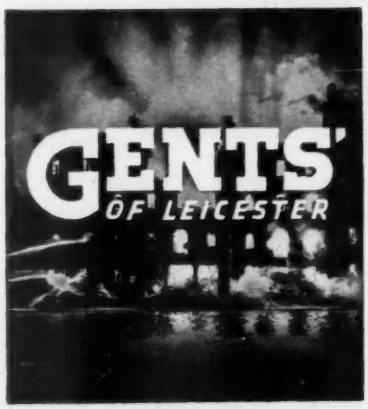
The "Strident" syren is ideal as a Fire Alarm signal and overcomes most noise levels. Only takes ¾ amp with consequent saving in wiring and current consumption. Totally enclosed motor for indoor use only, continuously rated. Base box drilled for ¾" conduit fitted with knockouts and can be turned through 90° to conform to conduit run.

PRICE 200/250 volts AC/DC (¾ amp consumption) 24 volts DC (2 amp consumption) **£7. 0. 0.**



The "STRIDENT" Syren

Alarms



Our informative booklet "Are You Protected?" *will give you further information on installing Gents' Fire Alarm Systems together with sample schemes. Write for your free copy without delay.*

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THIS IS REAL SELLING!

ARE YOU PLINTH WISE?
No matter what make of T.V. set you use, viewing in a completely darkened room is unwise and against all medical advice — particularly where children are concerned.
Read this extract from the report of the Chief Medical Officer of The Ministry of Education:
"A low light should be kept on . . . to reduce glare produced by marked contrast, which is so tiring to the eyes. There seems to be increasing evidence that the onset of *myopia may be hastened by indiscriminate televiewing".
*short-sightedness
The NEW REAL T.V. Plinth Light
PATENT
provides the complete answer for safe and restful viewing. The 15 watt lamp supplied gives a gentle non-distracting light, sufficient to conquer the contrast brightness without affecting the clarity of vision.
The R.E.A.L. T.V. Plinth is supplied complete with heavy glass diffusing plate, 3 yards flexible cord and 15 watt Osram lamp. Choice of finish: Pastel Cream, Gilt Lustre, or Eggshell Black
30/- COMPLETE (INC. P. TAX)
FOR EASY VIEWING NO GLARE
and no reflection on your screen
Obtainable from most Electrical or Radio Stores, in case of difficulty write to —
R.E.A.L. WORKS, BIRMINGHAM 18

Literally hundreds of thousands of R.E.A.L. Plinth Lights have already been sold, and this season an extensive and prominent advertising campaign in the National Press will launch . . . . THE NEW R.E.A.L. T.V. PLINTH with a sound "reason why" selling angle, as indicated in the reproduction of the advertisement shown here.

Mass-circulation papers and weekly magazines carrying the Plinth advertisements will include The Sunday Express, Daily Mail, Daily Express, Daily Telegraph, T.V. Times, John Bull, Punch, etc. The campaign commences at the end of September.

Place your stock order NOW whilst supplies are available.

FREE DISPLAY MATERIAL

This attractive point-of-sale display piece accommodating an illuminated Plinth against a darkened background is available free of charge to all retailers.

At 30/- complete with lamp (inc. P. Tax) the new R.E.A.L. T.V. Plinth, list No. 5001, is supplied in pastel cream, gilt lustre or egg-shell black, and this new price represents R.E.A.L sales-winning value to both trader and customer.

PATENT No. 659,876

Are you Plinth sales wise?

R.E.A.L. *is the registered trade mark of*
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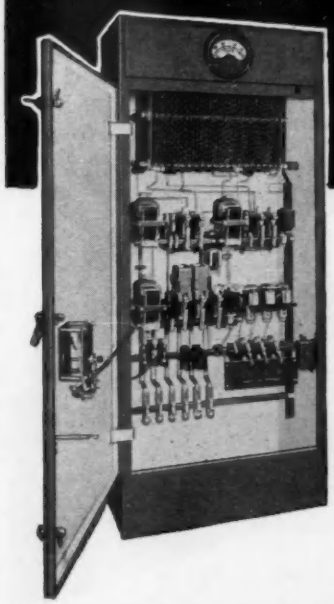
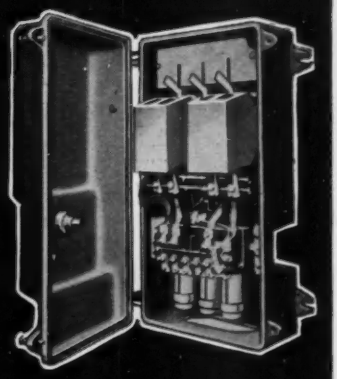
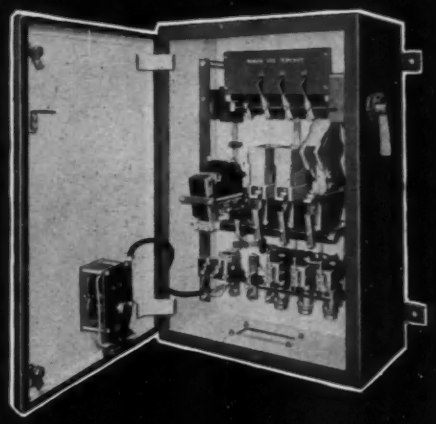
"ERSKINE HEAP"

CONTACTOR STARTERS





WELCOME TO OUR
STAND
No. 2705



We manufacture contactor starters of the direct-on, star delta or auto-transformer pattern for controlling squirrel cage motors, and of the stator and rotor pattern for controlling slip ring motors.

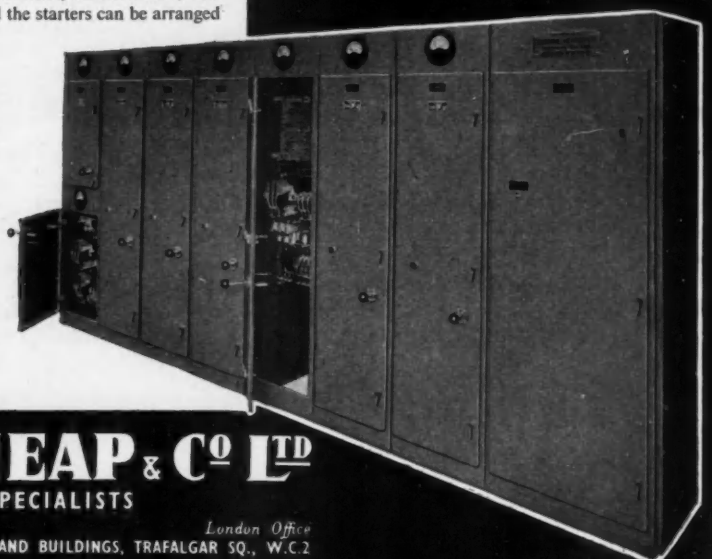
All overloads are of the accurate solenoid type, and above 10 H.P., powerful magnetic blowouts are incorporated. The contactors are mounted on bakelised steel bars and constitute a completely independent unit ready to be mounted in any frame, case or cubicle, and for any combination of equipment.

All contactors can be supplied either with or without fully interlocked isolating switch. All accessories such as 'hand' 'off' 'auto' switches, control circuit fuses and instruments can be mounted as required, and the starters can be arranged suitable for 'local' or 'remote' control or to be operated by float switches, pressure gauges, thermostats, etc.

WE ALSO MANUFACTURE

ALL TYPES OF HAND-OPERATED AIR-BREAK & OIL-IMMERSED STARTERS AND MOTOR CONTROL GEAR

The multi-motor panel type Switchboard illustrated (right) is one of many supplied to one of the leading petroleum companies.



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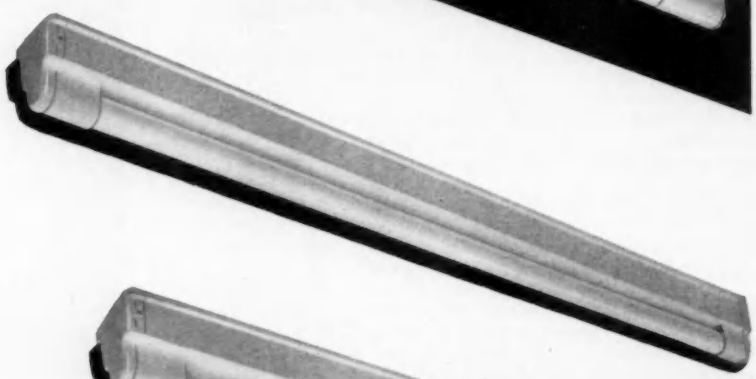
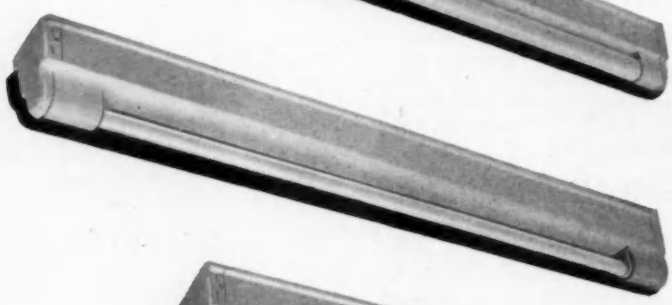
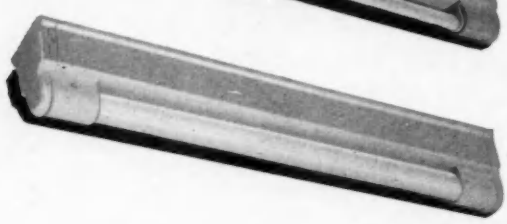


3ft 30W
F55122
£3 16 8



2ft 20W
F55123
£3 6 8



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A new technique in Electric Vehicle Battery Charging of far reaching importance to Fleet Operators.

The First COMPLETELY Automatic, inherently SAFE Electric Vehicle Battery Charger

C.V.C. charging offers the greatest advantages where several batteries have to be charged. It permits the shortest charging time for a single battery (3½ hours without exceeding the gassing limit normally associated with rapid charging) and also the shortest time per battery by parallel charging. Charging is simplified. (No relay, Battery Thermostat or switch). Batteries are charged with complete safety ensuring a longer life. The upkeep of the whole fleet is cheaper.

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THE DAVENSET C.V.C. CHARGER is an *Economic Necessity* for all electric vehicle fleet owners

For complete details write to the makers :—

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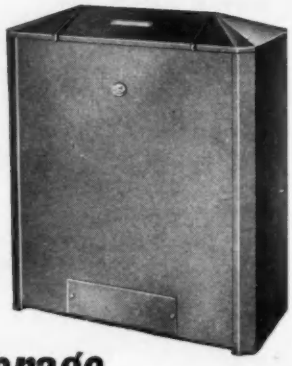

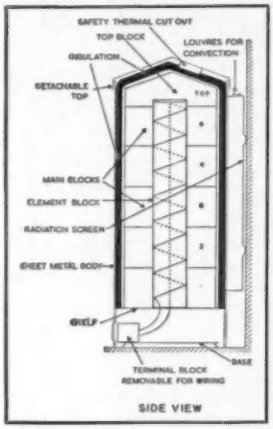

SIDE VIEW

The Ekco 'Thermostor' provides economical, clean, automatically controlled heating with complete safety. Accumulating a charge of heat by night and giving it off continuously by day, these thermal storage heaters keep the factory or office at a comfortable working temperature. The system is automatically controlled by a separately available time-switch, ensuring that current is consumed only during selected off-peak periods. In this way the heater uses electricity at its lowest cost.

...THAT IS SAFE

- Built-in safety cut-out in lid of casing prevents overheating.
- Robustly-constructed sheet steel casing attractively finished in bronze colour stove enamel.
- Specially styled sloping top to discourage use of the heater as a shelf.
- Combined wall-spacer and back radiation screen prevents undue heat loss and reduces wall-blackening to a minimum.

...AND ECONOMICAL

LOW INSTALLATION COST. No structural modifications are necessary. 'Thermostor' heaters need only reasonable floor space and electrical connections.

LOWER OPERATING COST. Charging period is from 8-10 hours nightly on off-peak tariffs, when electricity is at its cheapest and this provides continuous heating during the following day. Practically no maintenance or attention is necessary.

AUTOMATIC CONTROL. 'Thermostor' heaters require a time switch or for large installations a combined time switch and outdoor thermostat which varies charging period in relation to weather conditions. Room thermostats can also be used to maintain individual requirements.

'Thermostor' heaters are available in 2 loadings, 1½ kW which absorbs 12 kW hours from 8 hours charging and 2¼ kW which absorbs 18 kW hours during the same time. Both available with or without safety cut-out.

EKCO Thermostor

Thermal Storage Heating

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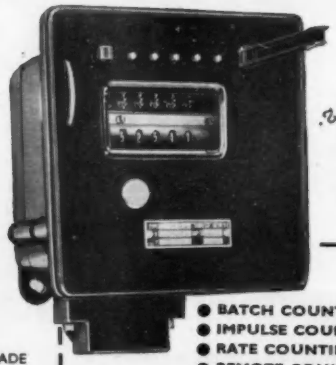
starts with counting



Batch Counting Unit with Automatic Reset

- BATCH COUNTING
- IMPULSE COUNTING
- RATE COUNTING
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Manufactured by Société des Compteurs de Genève, Geneva, Switzerland

The SODECO range of impulse counters and impulsing units provide the basic components for automation of counting, batching, positioning and other manufacturing processes. *Let us advise you on your problems.*

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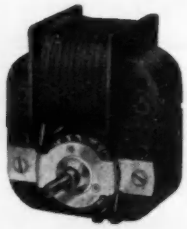
SHADED POLE FRACTIONAL H.P. ELECTRIC MOTOR



Reliable, Silent and Versatile Power Unit for every kind of equipment.

Standard Types from 25va. to 80va. or to Customers' Specification.

Manufactured by

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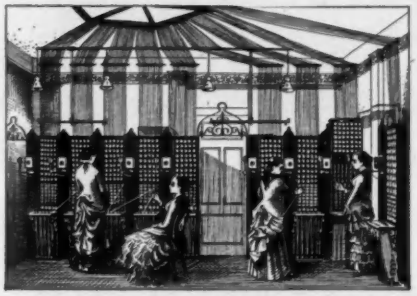
*From 700 Subscribers to 7 Million**



Within living memory, the telephone system in the United Kingdom has grown from a few miles of wire linking crude equipment, to an infinitely complex, and highly efficient service that connects with every part of the world. With it has grown Standard Telephones and Cables Limited—from a tiny office to one of the greatest telecommunications organisations in the Commonwealth; from two men and a boy to a staff of 25,000 producing an enormous range of equipment for every branch of the vast telecommunications industry.

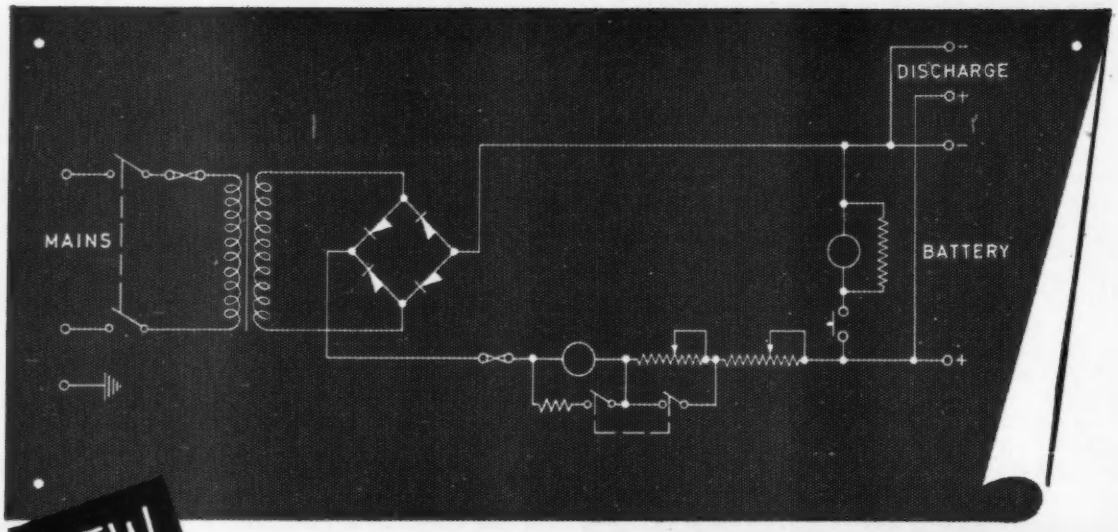
STC began by introducing the first telephone cables into England. Since then they have pioneered many of most important advances made in telecommunications engineering, and produced equipment for use all over the world. Their search for new ideas, new techniques and new equipment still goes on, for the story of STC is a story of progress—a story of leadership and service for 75 years.

* *In the U.K. alone there are 7,361,178 telephones and the system is being expanded at the rate of 5% per year. Much of the equipment needed is designed and produced by STC.*

Standard Telephones and Cables Limited

TELECOMMUNICATION ENGINEERS

CONNAUGHT HOUSE · ALDWYCH · LONDON · W·C·2



NEW

HIGHER CAPACITY · LOWER INITIAL COST!

POWER PACK

Many worthwhile improvements distinguish this new equipment, now available for immediate delivery. Current for tripping is higher. Tiered cell layout reduces cabinet dimensions—saves floor space. Two-rate charger replaces single-rate. Modern styling makes exterior cleaning easier and quicker. Here is equipment long known and trusted for its utter reliability, now developed to even higher efficiency—*at lower initial cost.*

For switch tripping, burglar alarms, fire alarms, bell systems, electric impulse clocks, or any application where an intermittent or continuous slow discharge is required.

S89

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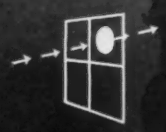

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Telephone: Central 1491

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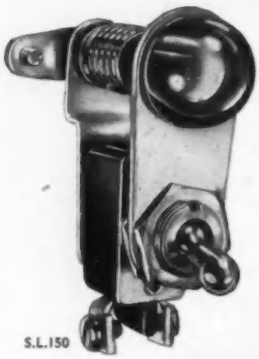
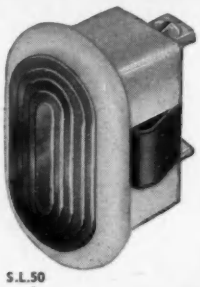
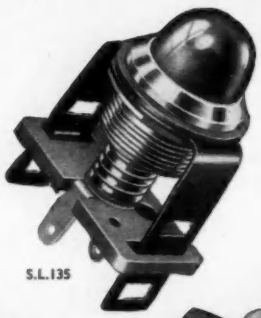

S.L.150


S.L.50

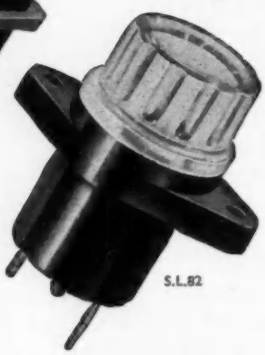
S.L.130

S.L.86


S.L.135

S.L.90/SB

S.L.100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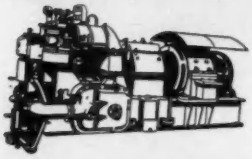

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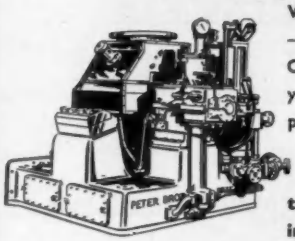

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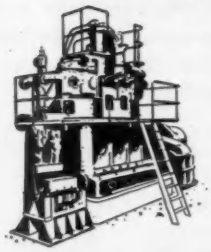

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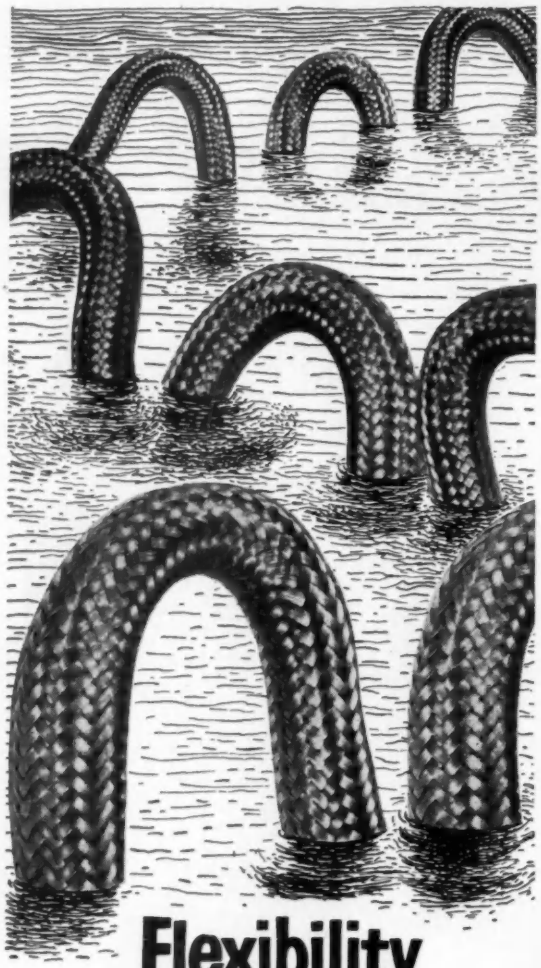

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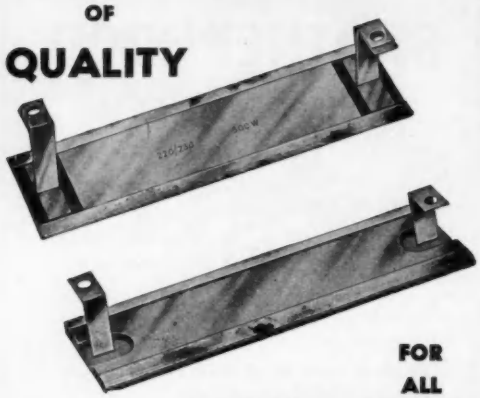

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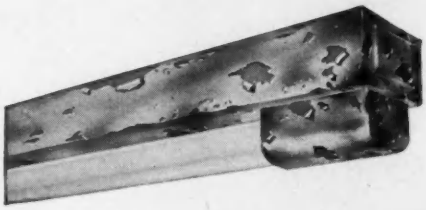

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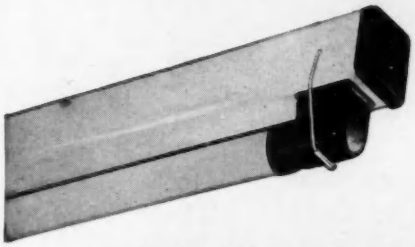

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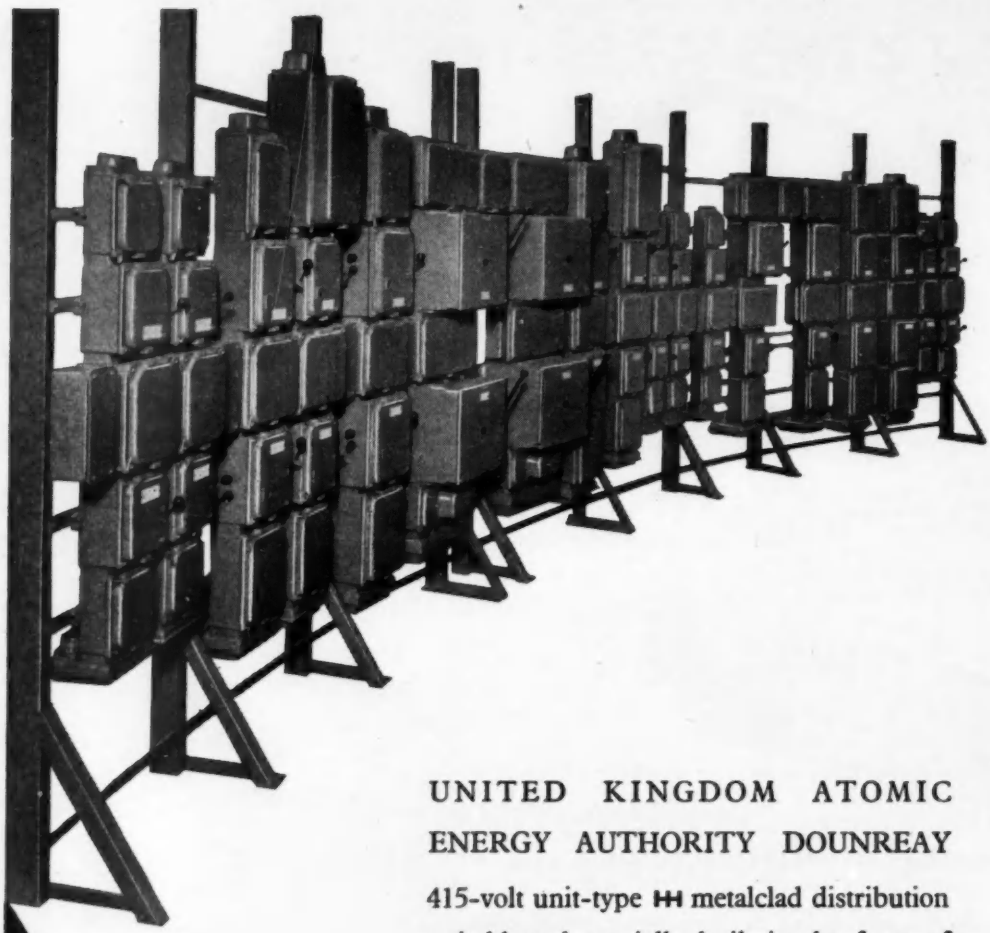

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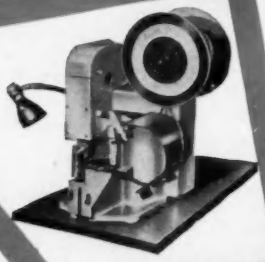
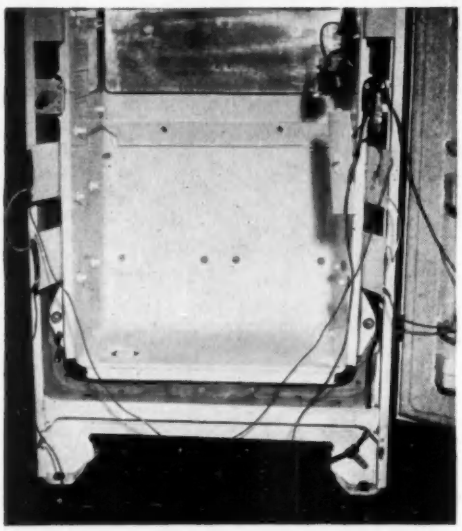
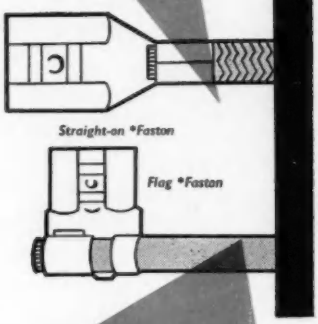


the means...



*The illustration shows refrigerator harness employing *"Fastons" for quick and easy assembly.*



Refrigerator photograph by courtesy of the "Prestcold" Division of the Pressed Steel Company Limited.

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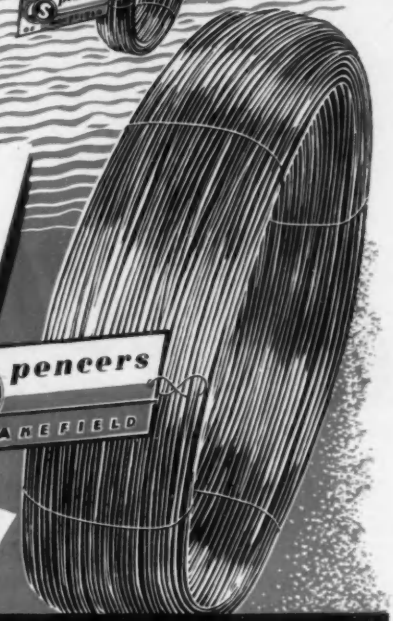

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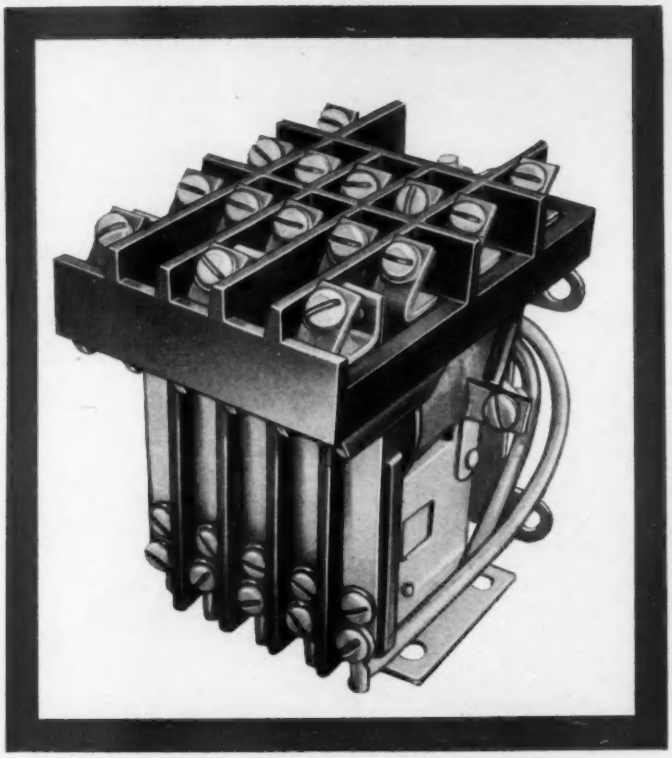

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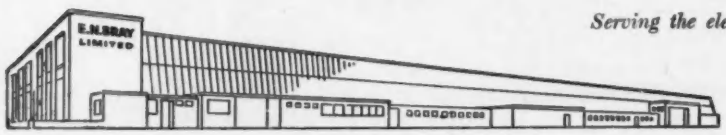

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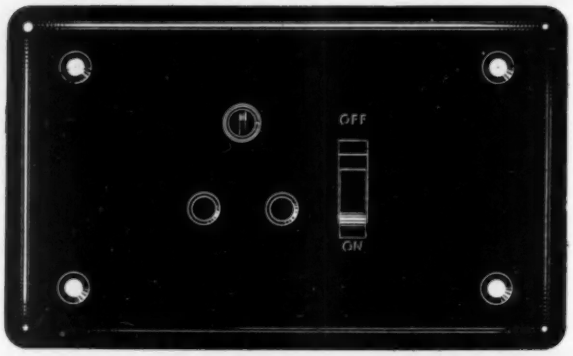

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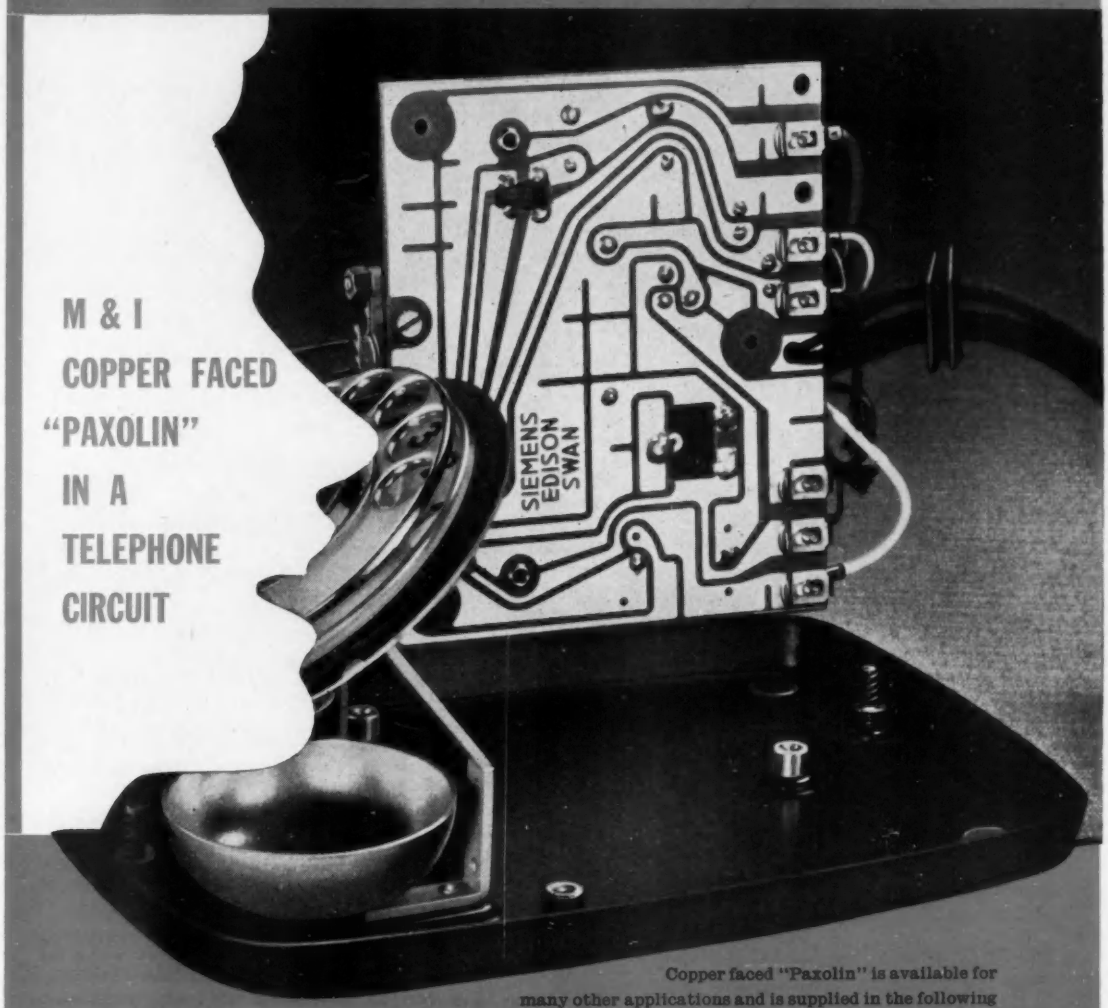

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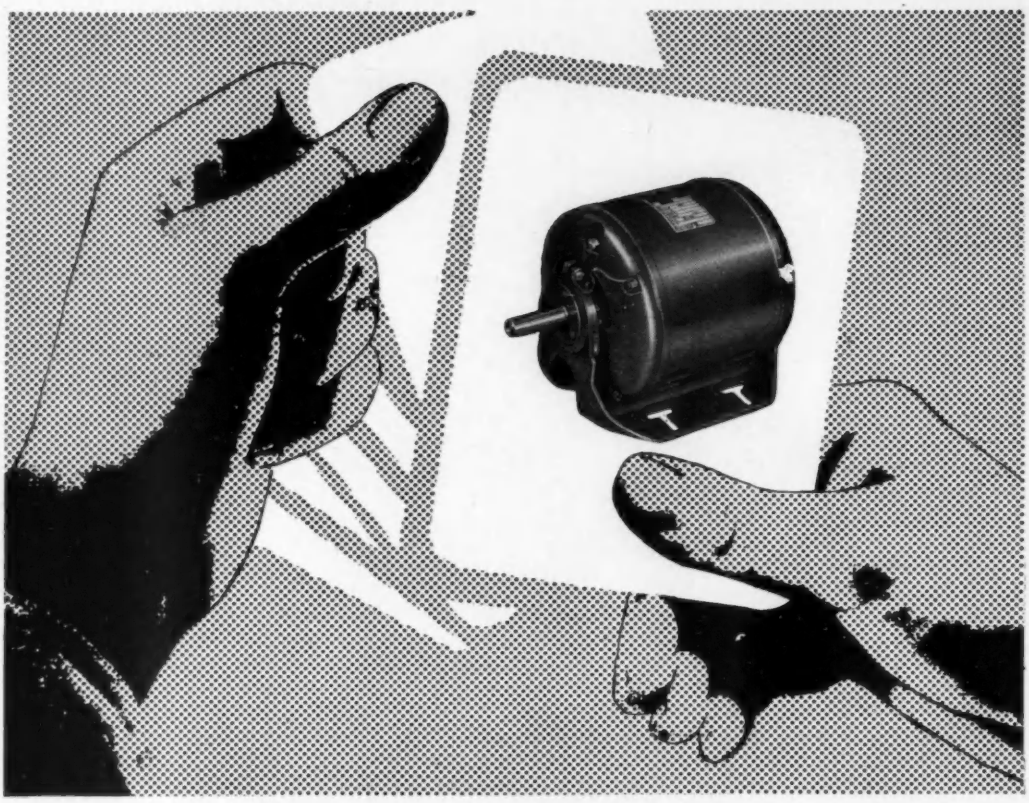

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You cannot interfere with a production line every time a new idea or a possible improvement to the product turns up. You have to let these ideas accumulate and then, in one clean sweep, incorporate the lot—or as many as are compatible—in a new design.

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3. Centrifugal Gear and O.C. Switch Completely new long-life design with minimum number of working parts; robust, quiet, positive and troublefree in operation.

4. Bearings 'Marathon' Mark III Bearings. These contain enough oil absorbed in felt specially made for the job, for two years running under normal operating conditions.

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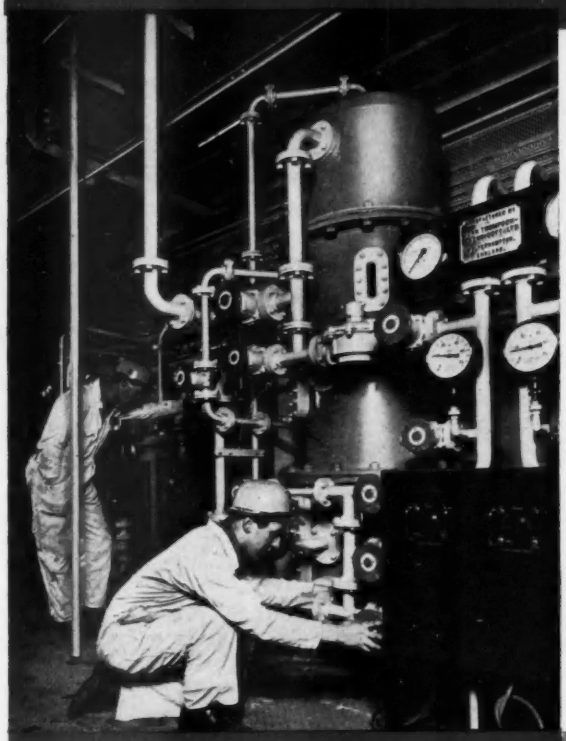

Steam-raising requirements in nuclear projects, as in industry and thermal power generation, demand feed-waters of correct quality for the particular application. The John Thompson-Kennicott mixed bed de-ionisation units seen here are installed to treat the boiler feed water for the U.K. Atomic Energy Authority's fast reactor at Dounreay.

The company undertakes investigation and production of suitable plant for de-ionisation, precipitation, filtration and other means of water treatment. It has substantial research facilities and is carrying out continual investigation into the use of industrial resins and the treatment of radio-active effluents.

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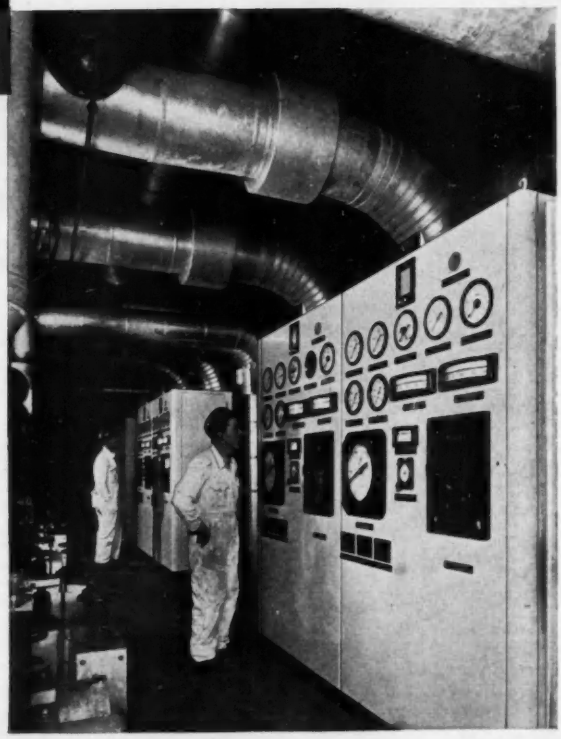

These instrument panels by the John Thompson Instrument Company are installed in the boiler plant of the Dounreay fast reactor. The Company constructs and installs complete instrument panels, including wiring and pipework, employing instruments of its own or other specified manufacture. In addition they undertake remote controls and special purpose devices.

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Stand No.	ESO	ES14	ES23	ES3
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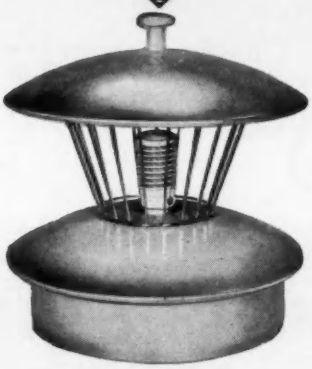
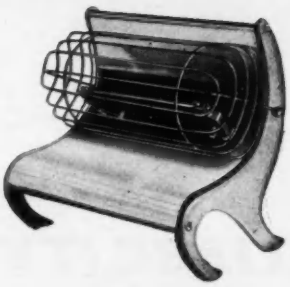
"PRECENTOR" — firebird — "CURTSEY"





THE "PRECENTOR"

This beautiful fire, traditional yet contemporary in design, carries an unusual delicacy of line, particularly in the crescent-shaped end pieces. Small gold coloured knobs adjust the chromium reflector to direct the heat exactly where it is wanted. List Price—1 kw **£3.16.0.** 2 kw **£4.17.0.** Price Including Purchase Tax **£4.12.8** and **£5.18.4.**

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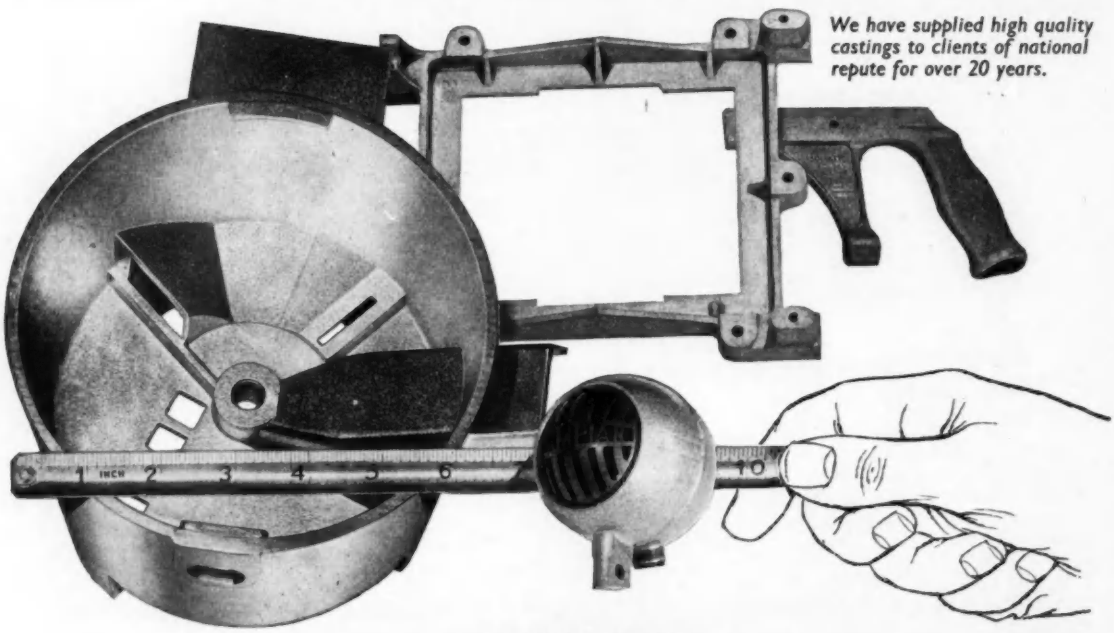

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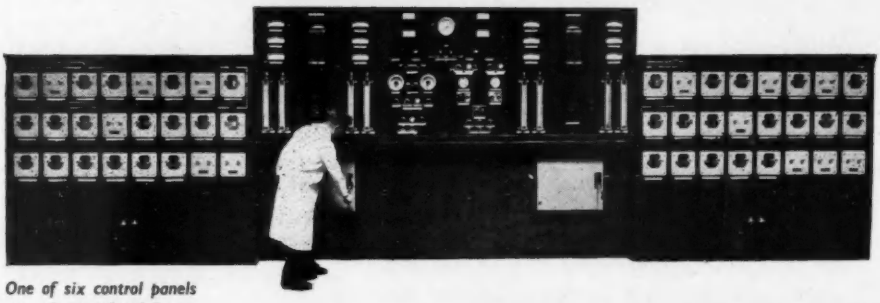

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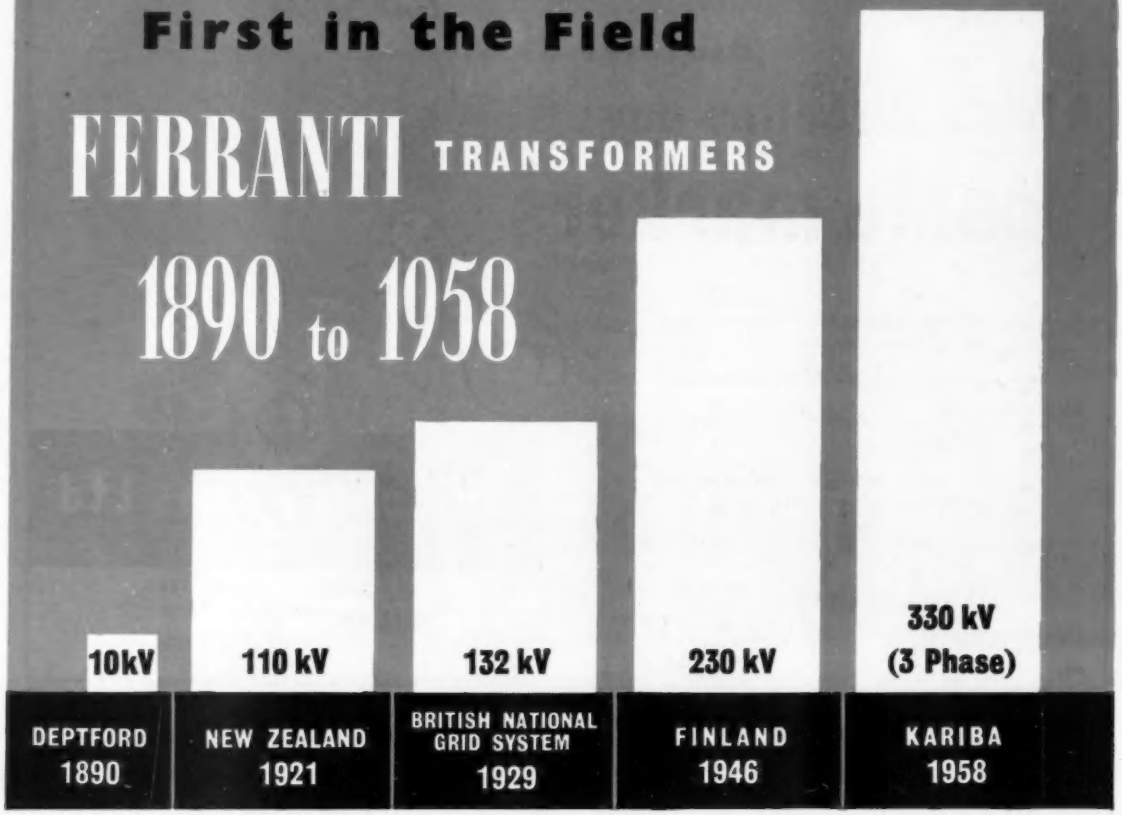

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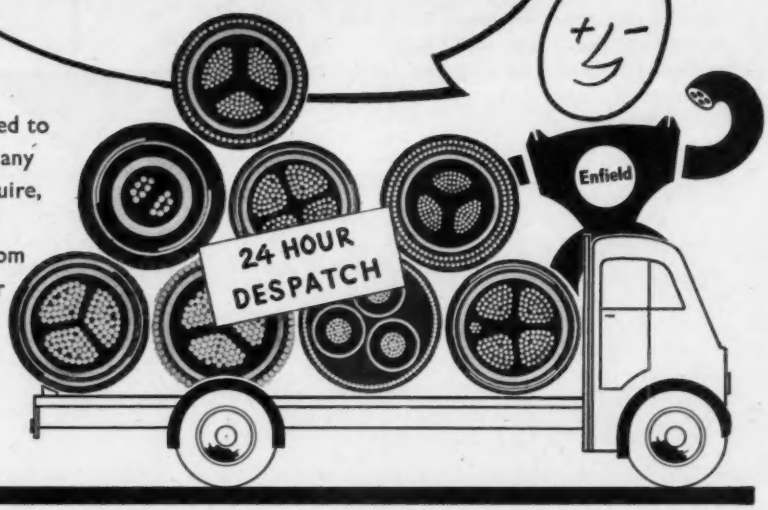

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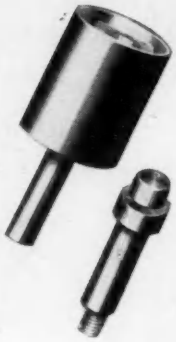

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all its long life . . . its name is Mazda
Mazda lamps stay brighter longer
. . . always ask for Mazda

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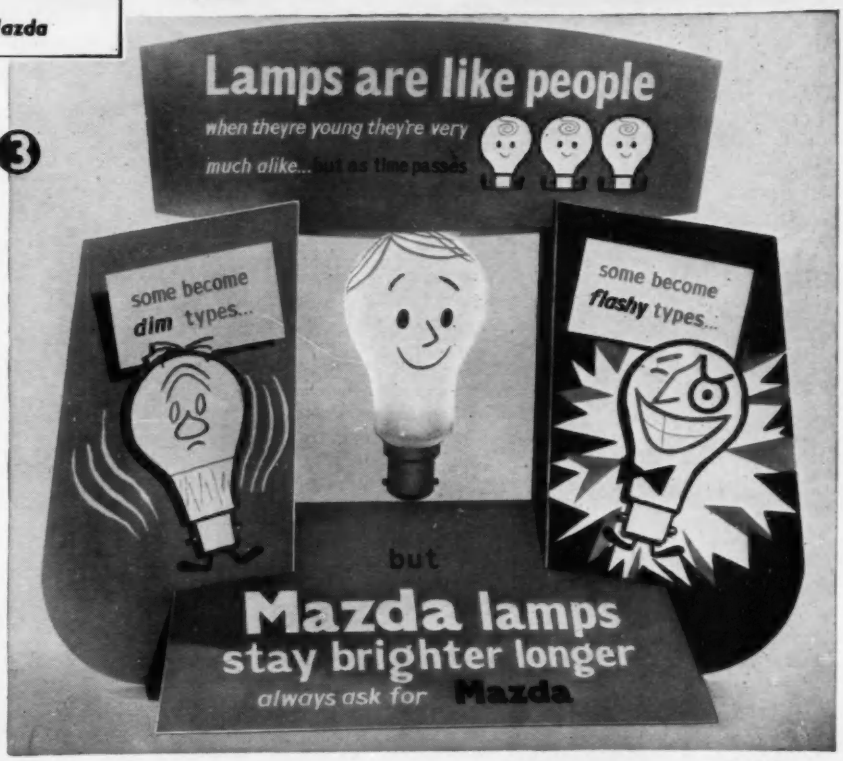
Lamps are like people
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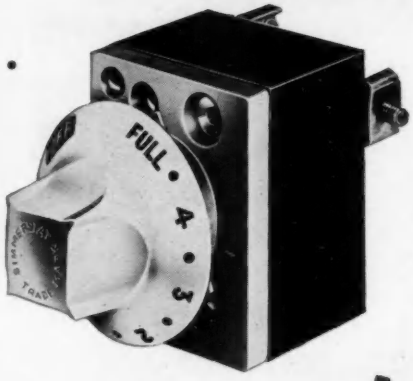

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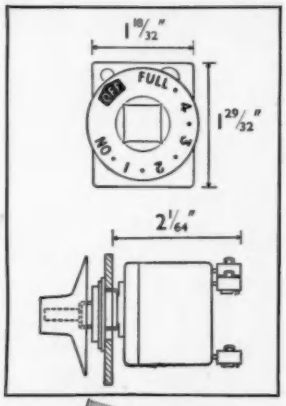

✳ *For the Few* housewives who still do not know about the 'Simmerstat', there is an attractive consumer leaflet. Supplies on request.

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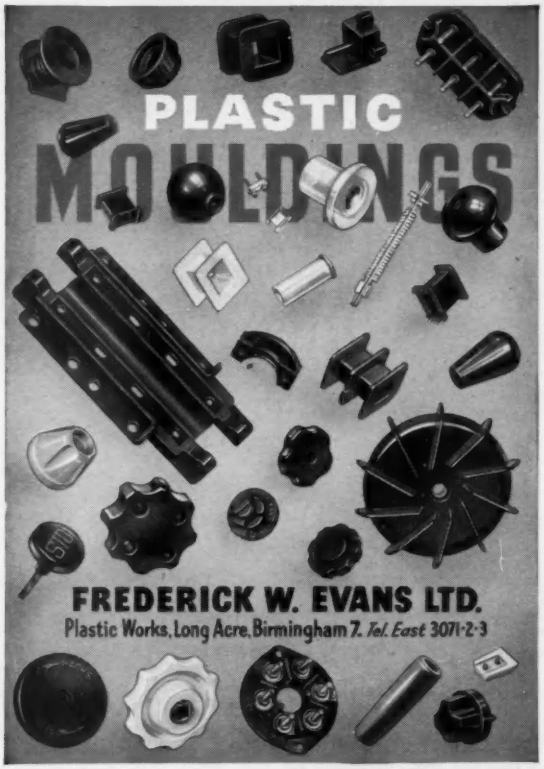

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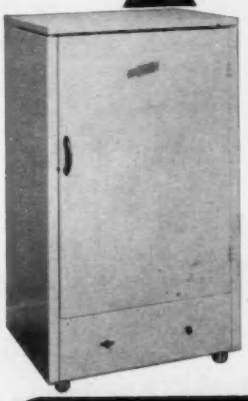

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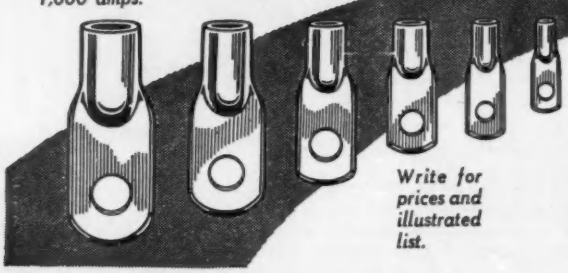

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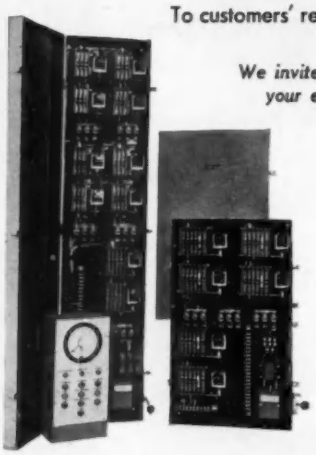

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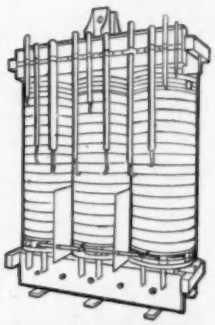

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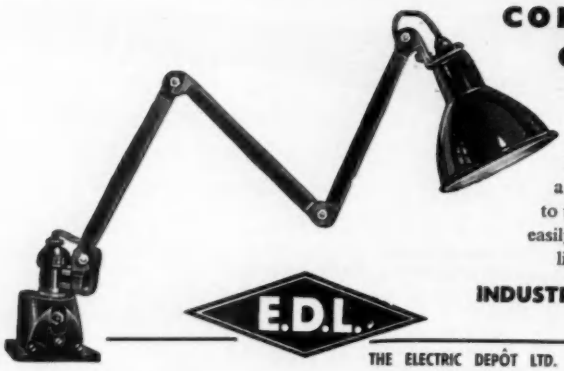

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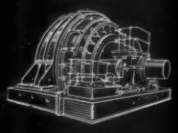

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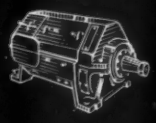

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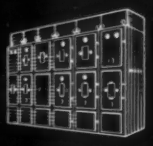

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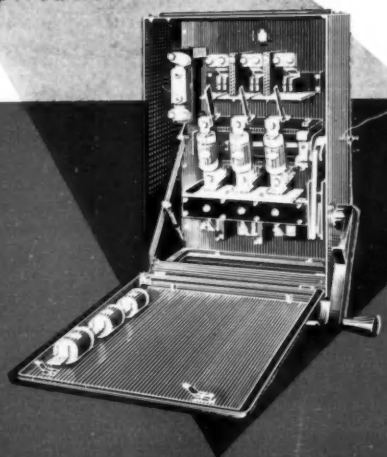

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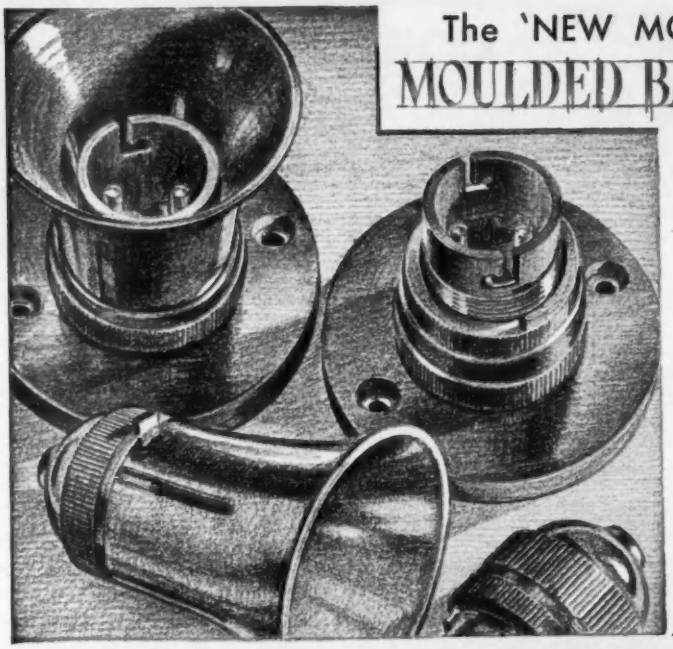

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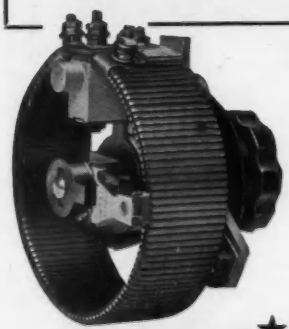

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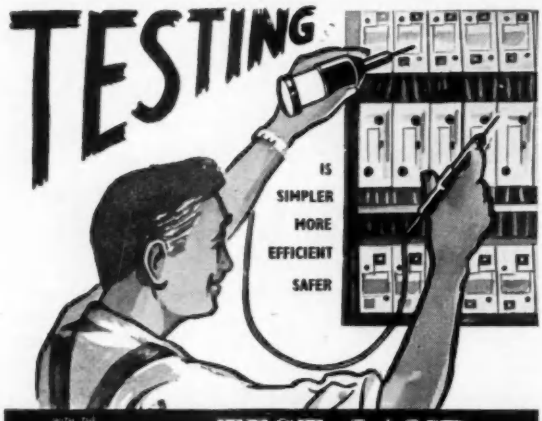

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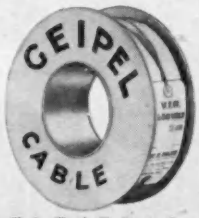

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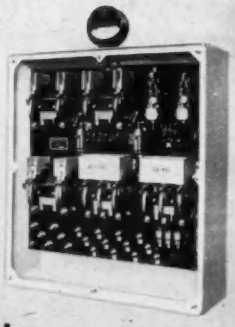

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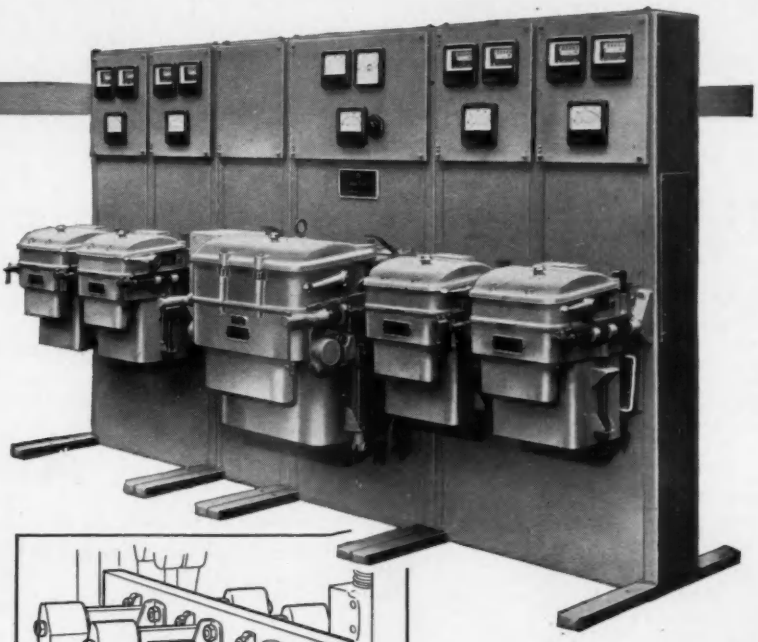

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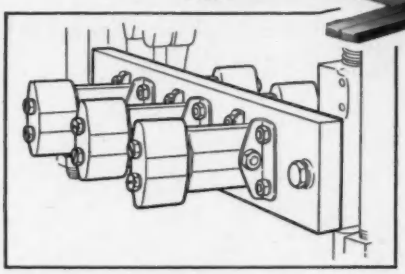

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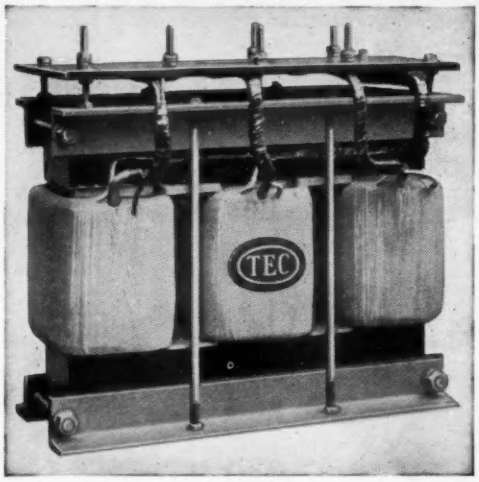

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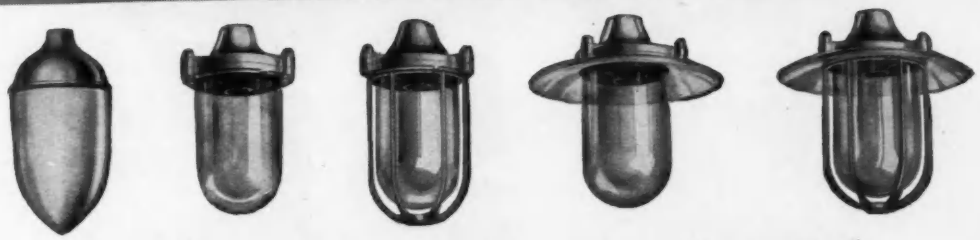

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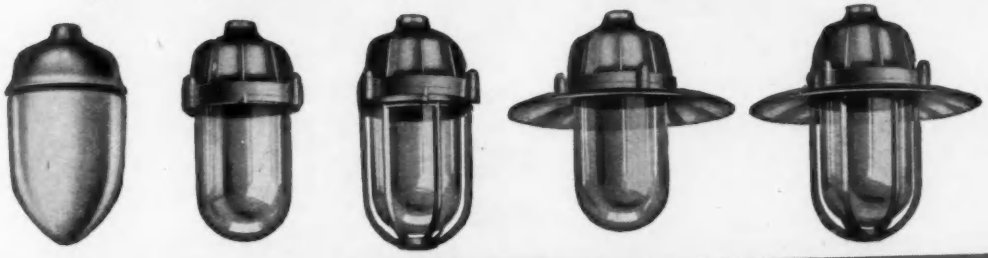

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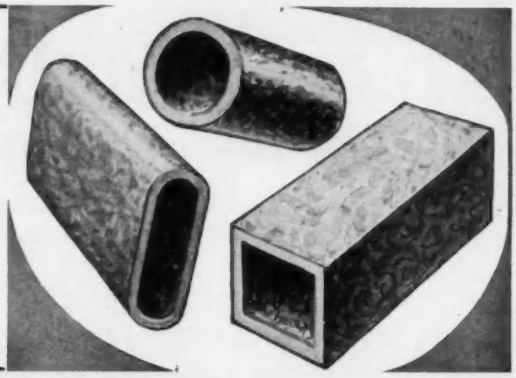

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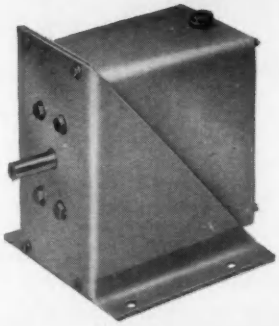

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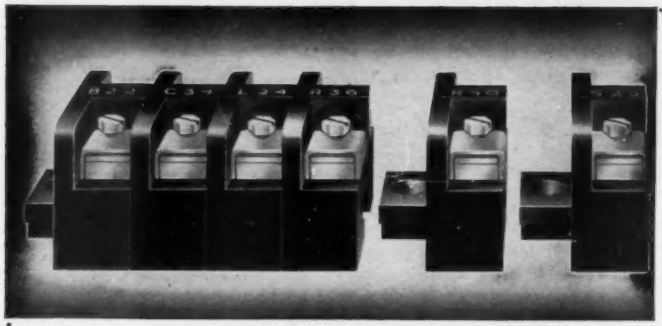

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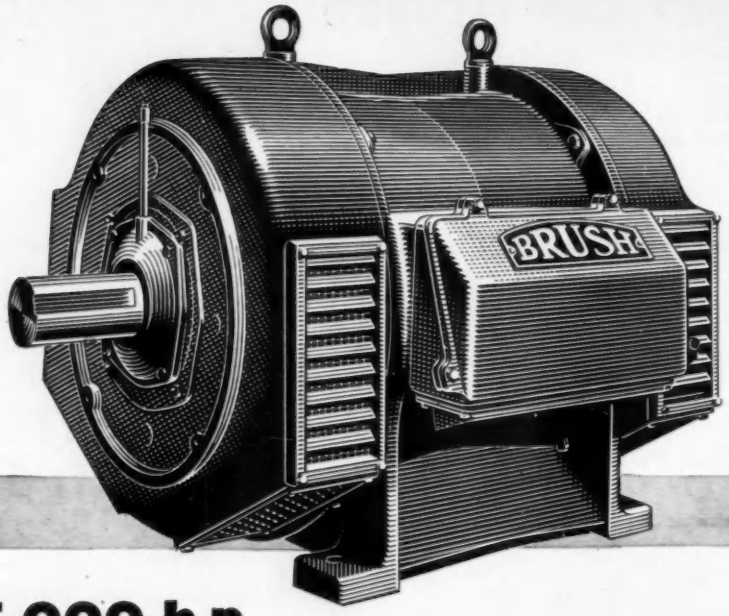

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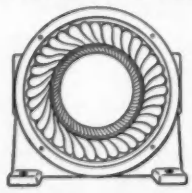
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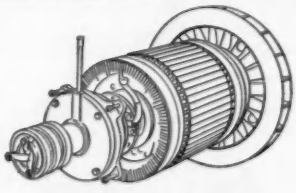
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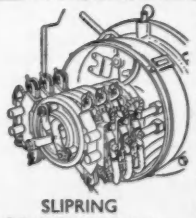
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✧ ✧ ✧ ✧

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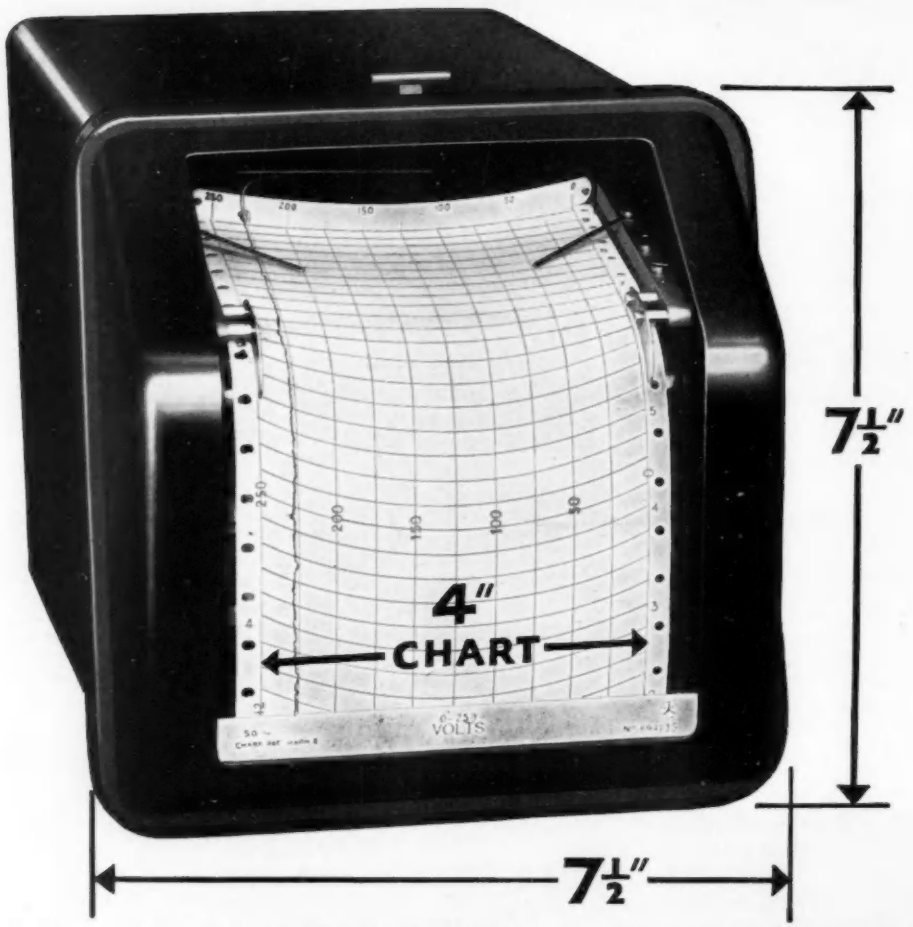

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ELECTRICAL REVIEW

5 September 1958 Vol. 163 No. 10 Established 1872

Nuclear Progress Since 1955

THE 1955 Geneva Conference on the Peaceful Uses of Atomic Energy was not only the largest scientific conference ever held but it marked the lifting of the veil of secrecy that had been hampering the interchange of information over nearly the whole range of "civil" applications of atomic energy. The background against which the present proceedings are taking place has altered radically and although there was no lack of optimism, and even wild speculation, three years ago, few people could have foreseen then that so much real progress would be made.

It is a measure of that progress that while only a few more countries are taking part the number of papers submitted has more than doubled. Great Britain, the United States, Russia and France are naturally making the largest contribution both in numbers and in the quality of scientific information, but it is significant that countries like Mexico and Hungary which submitted no papers in 1955 have this time prepared two and 28 respectively, and that Western Germany has increased its contribution from two to 65. Another important change compared with the first conference is the increase in the number of papers that are technological rather than scientific, which reflects the growing experience in the construction and operation of both research and power reactors. It is here that one sees most clearly the extent of British leadership.

While American and Russian efforts have been dispersed over many projects, Britain has concentrated with remarkable success on her original choice of the gas-cooled graphite-moderated reactor. As a result the world's first commercial-sized nuclear power station at Calder Hall has been in continuous operation for nearly two years and up to March this year had produced 690 million kWh of electricity. Also the ambitious nuclear power programme, which will enable 50 to 70 per cent of our electricity requirements to be obtained from nuclear stations by 1975, is well under way, and the four stations, totalling 1,400 MW, now under construction for the Central Electricity Generating Board and the South of Scotland Electricity Board amply illustrate the amount of development that has proved possible with a type of reactor that some people regarded as "old-fashioned" three years ago. Many further advances will be incorporated in later stations.

British firms have also made a vigorous attack on the export markets. Eight research reactors worth £16 million have been sold to Australia, Brazil, Canada, Denmark and Germany; a 200 MW power station is to be built in Italy at a cost of

£20 million; and agreement has been reached on the supply of nuclear plant to Japan. Sweden, Australia and Germany are other prospects. The smaller sizes of station have not been neglected and some interesting proposals are presented in the industrial exhibition at Geneva.

On the economic side there have been changes, and the present world surplus of coal and oil makes it likely that the general development of the use of nuclear power will move at a slower pace than was predicted three years ago. Many countries prefer to wait till the cost advantage of nuclear power is decisive, meanwhile training engineers and scientists in the new techniques. In this they may be encouraged by the prospects of harnessing the fusion reaction, which, when referred to three years ago by Dr. Bhabha, was thought of only as a distant possibility. It is a further measure of the progress made since 1955 that Great Britain, the United States and Russia have all been able to show that a fusion reactor will not only be ultimately possible but holds promise of the direct generation of electricity.

CONTROLLED NUCLEAR FUSION

The Anglo-American decision, announced at Geneva last week, to free the knowledge gained in the two countries of controlled nuclear fusion is a momentous one. There seems to be no doubt that ultimately the derivation of power from the atom will take the form of controlled fusion for the supplies of the " fuel " for this purpose will be limitless. Although the United Kingdom Atomic Energy Authority cautiously says that many years of sustained effort may be required to attain useful power in this way, the length of the period will be considerably shortened by the free exchange of information internationally.

REINFORCEMENT OR EXPANSION?

The justifiable emphasis placed upon the need for more power plant since the war has tended to upset the essential balance between generation and distribution. It is evident that the expanded demand for more electricity needs adequate networks as well as more generating plant.

Again, there has been a tendency to favour rural expansion at the expense of urban networks which need reinforcement, but in the South Western area, at any rate, this trend is now being halted. In a recent letter Mr. A. N. Irens, chairman of the South Western Board, has told a Cornish M.P. that because of capital restrictions rural electrification is having to be slowed down as there is a greater need for expenditure on system reinforcement. While it ought to be made possible to develop in all directions, it is only realistic to devote restricted funds to the most urgent needs.

FUTURE OF HIRE-PURCHASE

Although much fuss has been made of the decision of some of the leading banks to grant unsecured loans to their clients for the purchase of goods which are frequently obtained on the hire-purchase system, there is really nothing revolutionary in it; the banks are merely extending facilities which they have always been ready to offer " reliable " customers. What is of greater moment is the effect the decision is having on hire-purchase business generally. Already a number of prominent concerns which do much of their business on hire-purchase lines have announced reductions in their charges and in doing so have disclosed the fact that some of these charges provided ample margin for reduction.

Whatever the effect upon the profits of finance houses may be, there seems to be no doubt that all that has happened in the last week or two will have an influence upon the volume of hire-purchase business in which the suppliers of domestic electrical equipment are very much interested. One interesting point on which information is awaited is the attitude of the Electricity Boards. They are now the principal suppliers of some appliances but as they are self-financing their rates have been somewhat lower than those of " private " concerns and thus their room for manœuvre is not so great.

AIRCRAFT " ELECTRICS "

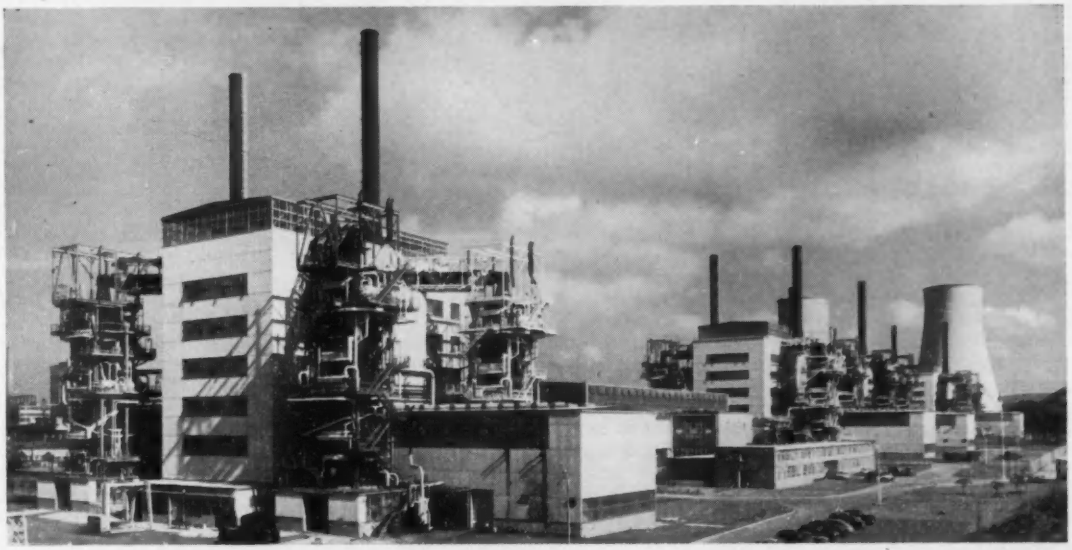
Some exhibitions of electrical equipment provide a surfeit of information which tends to overpower the non-specialist engineer. This is particularly the case in exhibitions of components where the numerous items do not present a connected story. The static exhibition at Farnborough, which contains many electrical items, falls into this class and cannot be fully appreciated without some knowledge of the special requirements of aircraft electrical equipment. Most of these requirements can be easily understood once the jargon used by aeronautical engineers has been translated. In our survey of the exhibition in this issue we have tried to indicate the relationship of individual items of equipment to the complete aircraft electrical system so that ordinary electrical engineers will be able to view the individual items in their proper perspective.

The only electrical equipment in the first planes which flew was the ignition system. The electrical power consumption of an individual modern aircraft now approaches 100 kW but no one standardised system of generation has yet been accepted. Now that constant speed drives and brushless alternators have been developed, it is hoped that the 200 V, 400 c/s system will soon be universally adopted.

VISITORS TO BRUSSELS

The International Exhibition at Brussels has still about six weeks to run and interest in the display is being well maintained. Since the opening in April over three million people have visited the British Industrial Pavilion in which the electrical industry has a large stake. The *Board of Trade Journal* states that the average daily attendance has risen from 19,000 in May to 23,000 in June, over 27,000 in July and over 33,000 in August; on 22nd August a peak of nearly 37,000 was reached.

Whether or not tangible benefits arise immediately from our industry's display, there can be no doubt that many influential visitors must have been impressed by it, with possible future results. Electrical people who have not yet seen the Exhibition should certainly make a point of doing so.



The world's first full-scale nuclear power station—Calder Hall

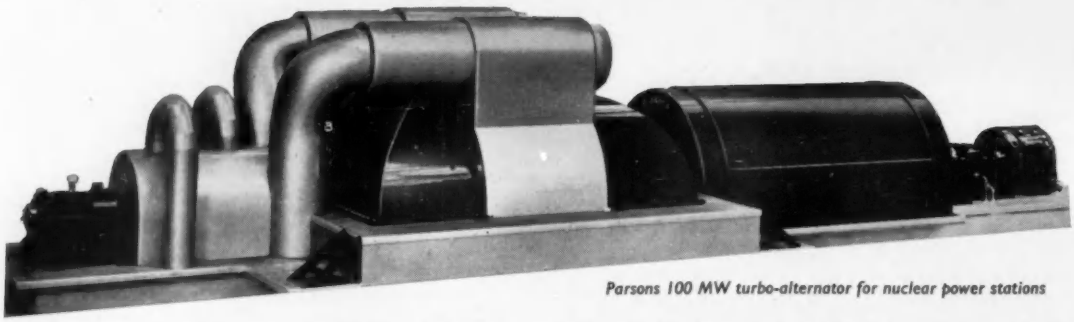
BRITISH EXHIBITS AT GENEVA

Over 300 exhibitors from 13 countries are taking part in the International Exhibition of the Peaceful Uses of Atomic Energy which opened in Geneva on Sunday. The British display is supported by 84 firms and is on a larger scale than that of any other country. An account of the opening session of the second International Conference on the Peaceful Uses of Atomic Energy, which is being held in Geneva from 1st to 13th September, appears on page 417

CONCURRENTLY with the second United Nations conference on the peaceful uses of atomic energy, "Atoms for Peace," which opened in Geneva on Monday, there is an independent exhibition at the Palais des Expositions, which is without doubt the largest and most comprehensive display of the industrial and commercial applications of atomic energy yet held anywhere in the world. Altogether over 300 exhibitors from 13 countries are participating, including 84 British firms, and it is encouraging to note that the British display is on a larger scale than that of any other country. The exhibits of British manufacture range from reactor control apparatus, radiation monitors, surveying instruments and computers, to models of nuclear power stations and research reactors at present operating or under construction. A great deal of specialised equipment such as reactor simulators, linear accelerators for use in the plastics industry, and remotely controlled mechanical handling gear is also on view, with examples of the latest radioisotope technology and a demonstration of the United Kingdom Atomic Energy Authority's world-wide fuel service for builders and operators of British reactors.

This industrial exhibition, it should be pointed out, is quite distinct from the separate scientific exhibition which is being held in the grounds of the Palais des Nations to illustrate the papers presented at the conference. Here the U.K.A.E.A. is showing not only large-scale models of ZETA and SCEPTRE but also a working model of apparatus now in use at the Atomic Weapons Research Establishment. In addition to the fusion work there are sections demonstrating the reactor research programme, some aspects of power research, the technology associated with nuclear developments, including surveying for raw materials, research into fuel elements, instrumentation, reactor chemistry, chemical processes and fission product disposal. Among the models on view are the high-temperature gas-cooled experimental reactor at Winfrith Heath and the nuclear power stations now being built for the Central Electricity Generating Board.

In the industrial exhibition in the Palais des Expositions the U.K.A.E.A. illustrate the practical aspects of nuclear reactors, instruments and materials and due emphasis is given to the fuel element service which can support the export of reactors, together with the developments in isotope production and sales service. To show the developments which have taken place in the United Kingdom during the past three years a film entitled *More Power from the Atom* is being shown for the first time to delegates and visitors to the conference. The film was shot at most of the Atomic Energy Authority's establishments as well as at the new power stations being built



Parsons 100 MW turbo-alternator for nuclear power stations

for the C.E.G.B., and it gives a graphic impression of the effort which we in this country are devoting to the peaceful development of atomic energy.

Visitors to the stand of the General Electric Co., Ltd., and Simon-Carves, Ltd., can walk inside a full-size replica of a section of a gas-cooled graphite-moderated reactor, similar to the two under construction at the 320 MW Hunterston power station of the South of Scotland Electricity Board. Entering through one of the gas-outlet ducts, all the principal internal components can be seen, including the graphite core with its reflector, the boron-sandwich shield above the core, the double-shell pressure vessel, the fuel elements, control rods, and gas-sampling tubes for burst cartridge detection equipment.

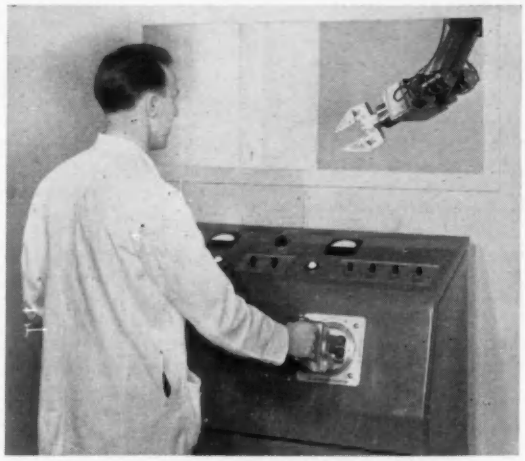
Other exhibits on this stand include a graphite which is impermeable to gases and resistant to gaseous corrosion. It offers potentialities as a fuel-canning material and as a moderator for use with liquid metal coolants. The impermeability of this material is demonstrated by a display of a graphite tube, the inside of which is charged, at a temperature well above 500 deg C, with carbon dioxide at a pressure of ten atmospheres while a vacuum is maintained at the outer surface. There is also an illuminated schematic diagram of a high-temperature gas-cooled zero-energy critical assembly, an animated diagram of a burst cartridge detection equipment, a model of one of the Hunterston steam raising units, and a working demonstration of the company's heavy-duty power manipulator.

The dominant theme of the English Electric-Babcock & Wilcox-Taylor Woodrow Atomic Power Group's stand is the 500 MW Hinkley Point power station. A transparency, 20ft by 10ft, illustrates the station in an advanced stage of construction. The work which this group has done on other designs of gas-cooled graphite-moderated stations for overseas markets is illustrated by, for example, a display panel showing single-reactor stations with electrical outputs of 150 and 250 MW. Other items on the stand include typical examples of fuel element cans showing progress towards improved heat transfer properties; corrosion specimens of magnesium alloy, zirconium, low carbon steel, and titanium showing the effects of dry carbon dioxide gas on the metals after periods of up to 10,000 hours at a temperature of 500 deg C; fuel element supports in zirconium; thermal cycling of standard "pippa-type" uranium through the $\alpha - \beta$ transformation; and internal pressures on end-cap welding. There will also be a display, with actual weld specimens, showing the direct influence of improved site welding techniques in reducing the capital cost of a nuclear power station.

Another exhibit shows examples of a special shock absorber device developed by the group's laboratories at Whetstone to prevent possible damage to the reactor structure from the accidental dropping of control rods.

The display by the A.E.I.-John Thompson Nuclear Energy Co., Ltd., is centred around four models. There are the 275 MW Berkeley power station; the "Merlin" research reactor, two of which are nearly completed and the first of its size to be sold to a European country by British private enterprise; a typical 150 MW single reactor power station of a type that can be offered for export; and SCEPTRE III, the thermonuclear discharge chamber. Around these models the constituent members of A.E.I.-John Thompson show how they are welding the 1,000 ton pressure vessels at Berkeley, and how they overcome the difficulties in welding 3in steel on site. They also describe their achievements at Dounreay, where they built the spherical pressure vessel and also the liquid-metal circuits, the primary and secondary liquid-metal/water heat exchange system and complete steam and water equipment with boilers, associated instrumentation and water treatment plant.

Metropolitan-Vickers show not only the work they have done in building and partly designing ZETA, but also illustrate their control systems as installed at Calder Hall and Chapelcross and the 82·5 MW turbo-alternators they are constructing for Berkeley. The British Thomson-Houston control system for Berkeley and their



Operator at control console of G.E.C. power manipulator

"blowers" and valves, which are a vital part of the reactor cooling circuit, are also shown. Sunvic Controls, Ltd., and Isotope Developments, Ltd., show examples of nuclear instrumentation such as magnetic memory storage drums, the Barton meter, a level detector and an auto-scaler.

The Nuclear Power Plant Co., Ltd., are exhibiting a

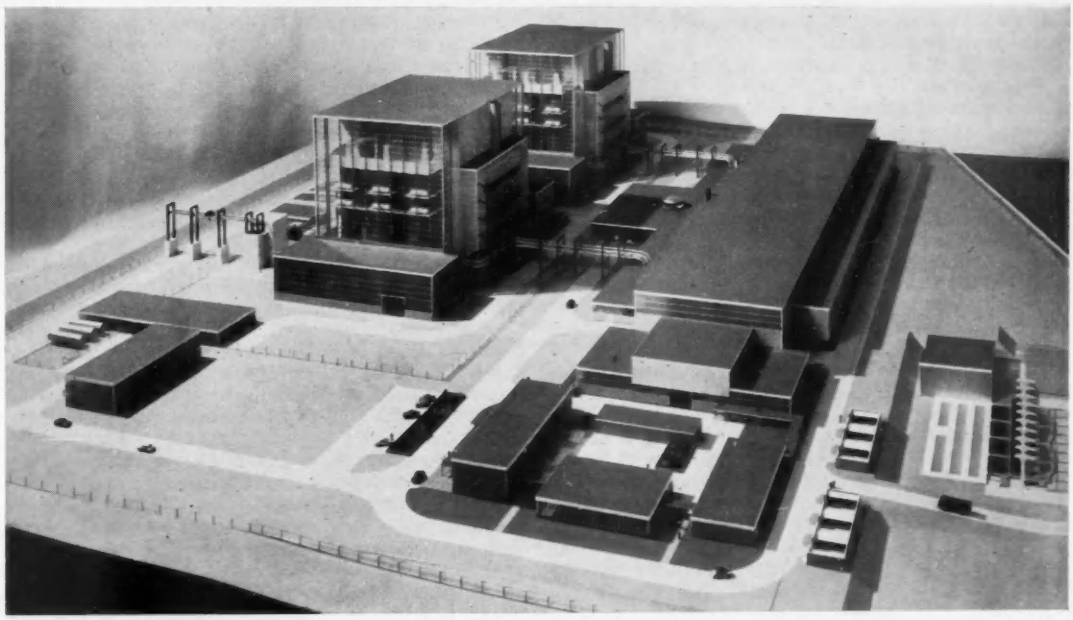
comprehensive display of models, one from each of its eight member firms. There is a model of a 400 MW nuclear power station complete with two reactor buildings (one animated), a fully equipped turbine house, a switchyard, circulating water pumphouse and other miscellaneous buildings. C. A. Parsons & Co., Ltd., have a model of a 100 MW turbo-alternator of the type designed for installation in nuclear power stations, while Clarke, Chapman & Co., Ltd., show a model of Brunswick Wharf steam raising plant. A. Reyrolle & Co., Ltd., are exhibiting two models of switchgear equipment. Models of a "Counterflo" induced draught cooling tower and a Bradwell boiler are shown by Head, Wrightson & Co., Ltd. On the same stand Strachan & Henshaw, Ltd., are showing an animated fuel element grab, and Whessoe, Ltd., have on display a typical weld section for a reactor vessel. Sir Robert McAlpine & Sons, Ltd., are exhibiting the construction techniques for a reactor building, and samples of structural steelwork are shown by Alex. Findlay & Co., Ltd. A model of a ship is also displayed by Swan, Hunter & Wigham Richardson, Ltd., this concern having recently signed an agreement with the Nuclear Power Plant Co., Ltd., with regard to collaboration on marine nuclear power units.

The stand of Vickers Nuclear Engineering, Ltd., which comprises Vickers, Ltd., Foster Wheeler, Ltd., and Rolls-Royce, Ltd., depicts the work of the group in developing reactors for marine and aircraft propulsion, and small power stations (15 to 50 MW). A model of the LIDO reactor is shown together with photographs of the original reactor in use at Harwell. Other models include an advanced gas-cooled reactor in a supertanker and a pressurised water reactor in a large tanker. There are also models of steam/water separators and the "chevron" steam dryer.

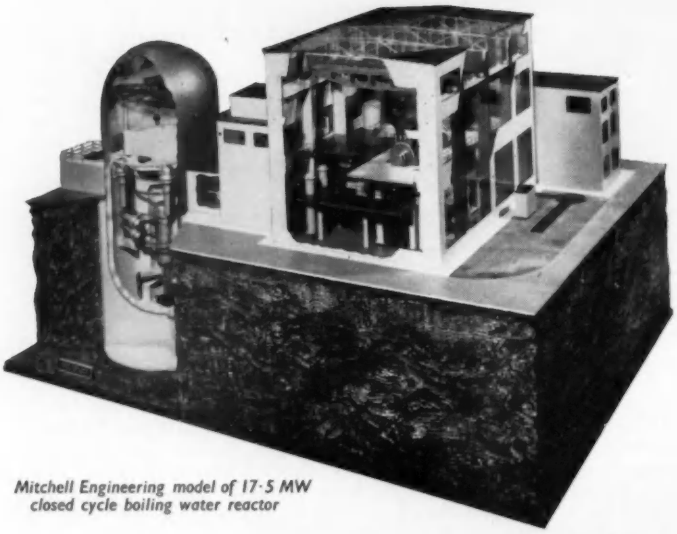
Atomic Power Constructions, Ltd., is the youngest of the five British nuclear power groups and the display demonstrates its ability to design, construct and commission atomic power stations of all sizes. A drawing office is included in the stand, complete with drawings of a power station for technical discussion. There is also a model of a typical 500 MW station. Other exhibits portray the activities of the associated concerns in the application of atomic energy. For instance, Crompton Parkinson, Ltd., are showing a self-regulating alternator with "Magnicon" exciter mounted on the alternator shaft. The Fairey Aviation Co., Ltd., is displaying aluminium fabrications for atomic energy plant, while International Combustion, Ltd., shows component parts of a heat exchanger for a gas-cooled graphite-moderated reactor and illustrates their position on a part-section model. Finally, Richardsons, Westgarth & Co., Ltd., have a model of a Richardsons Westgarth-Brown Boveri turbo-alternator set, together with condensing plant and feed-heating system, especially designed for the steam conditions of a modern nuclear power station.

A scale model of a 17·5 MW electrical output closed cycle boiling water reactor forms the centrepiece of the Mitchell Engineering, Ltd., stand. This is flanked by illuminated flow diagrams of 17·5 and 70 MW electrical output reactors. The company are contractors for stations of from 17·5 to 140 MW electrical output (based on closed or open cycle), in association with the American Machine & Foundry Co.

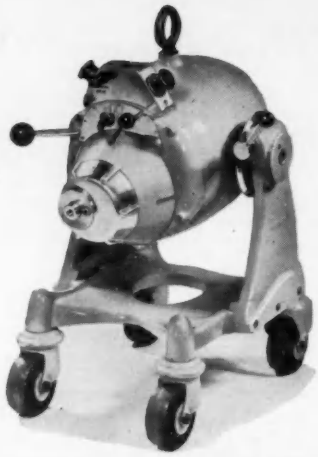
The De Havilland Engine Co., Ltd., has a twelfth-scale model of the PLUTO high-flux reactor, sectioned to indicate the layout of the high-temperature gas-cooled loop designed in collaboration with A.E.R.E. There is also an electrically-energised rotative assembly mounted on self-acting gas journal bearings, which is provided with push-button starting to demonstrate the action of this type of bearing. Other exhibits include small high-speed gas circulators incorporating self-acting gas bearings and safety control valves for use in radioactive gas circuits. In an allied field Hayward Tyler are showing a glandless motor pump unit consisting of a single shaft rotating in two journal bearings within a pressure-tight casing. The upper part of the shaft carries



Model of Hinkley Point 500 MW nuclear power station



Mitchell Engineering model of 17·5 MW closed cycle boiling water reactor



Nuclear Engineering gamma radiographic units for inspecting iron and steel from ¼in to 8in thick

the motor rotor, the pump impeller being at the lower end. The electric supply cable, entering the casing through sealed stationary glands, is coupled to the plastic-covered stator windings which are immersed in the liquid which is being pumped. Cooling is effected by a circulating impeller incorporated in the thrust bearing and by an external heat exchanger.

Examples of design and development work in the application of atomic energy to propulsion are shown by Rolls-Royce, Ltd. The main exhibit is a model of the zero energy reactor NEPTUNE designed to assist in the development of a power reactor for the submarine *H.M.S. Dreadnought*. Also on display is a fine control gear box for the reactor LIDO. Working exhibits include the absorber control and Herriott probe for NEPTUNE and an analogue computer for use in designing reactor control systems.

Something of the oil industry's part in the atomic age is illustrated by the Shell Petroleum Co., Ltd. One section of the exhibit is devoted to research into radiation-resistant lubricants, while another shows the application of atomic power lubricants and high-grade conventional lubricants. The exhibit also covers research into conventional lubricants by means of radioactive tracers. The "Mercury" high-speed electronic computer is the principal exhibit of Ferranti, Ltd. Four of these machines are already being used in nuclear research and ultimately seven will be used in the nuclear field. A system has been set up for exchanging information among all users so that each can benefit from the accumulated experience of the others.

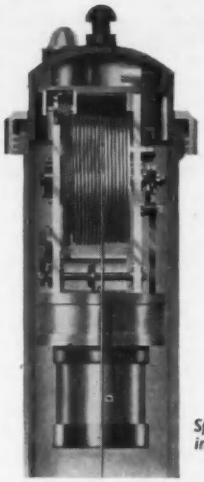
The comprehensive I.C.I. display indicates some of the extensive contributions which this organisation has made to the development of atomic energy, with emphasis on metallurgical products for the nuclear engineering industry. The Metals Division now supplies many specialised products for nuclear reactors. Aluminium finned tubes have been supplied for canning in many of the British experimental reactors, while Marston Excelsior, Ltd., has been responsible for the assembly of enriched fuel elements for the water-cooled research reactors DIDO, LIDO, DIMPLE and MERLIN. The display includes samples of products made from new metals such as beryllium, vanadium, niobium, titanium and zirconium. Other exhibits in this collection include examples of fuel cans, "Integron" heat exchanger tubing and a number of fabricated components.

The A.P.V. Co., Ltd., has fabricated the aluminium core tanks for most of the British research reactors and some for overseas. The display includes illustrations of tanks for three of these reactors, as well as a selection of weld samples and techniques. On the same stand A.P.V.-Paramount, Ltd., show one of the reactor guide pan steel castings supplied to G.E.C.-Simon-Carves for the Hunterston nuclear power station and also lantern and plug castings in stainless steel for Bradwell. In addition, castings are shown in a series of corrosion and heat resisting materials for other nuclear energy projects. Further exhibits include examples of the extensive range of "Paralloy" Forging-Quality cast stainless and alloy steel pipe fittings.

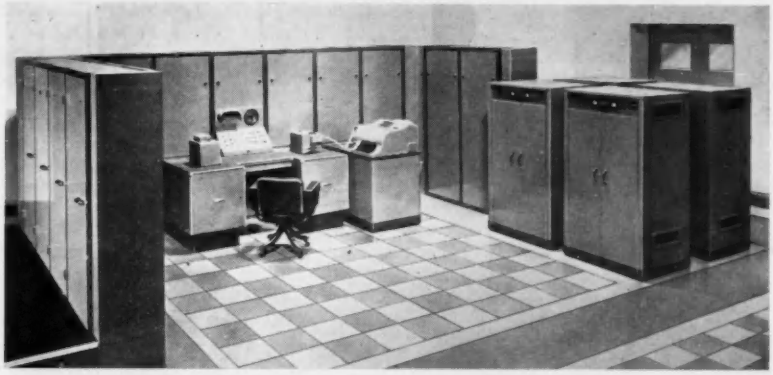
The combined stand of the Mond Nickel Co., Ltd., and its associate Henry Wiggin & Co., Ltd., emphasises the world-wide service of technical information about nickel-containing materials and the role of nickel in the field of nuclear engineering. Some 60 technical publications support information panels dealing with corrosion resistance, strength at high temperatures, welding, controlled thermal expansion, and the cobalt-free characteristics of Mond Nickel pellets.

The comprehensive selection of reactor components shown by T.I. Nuclear Engineering, Ltd., includes a pressure vessel, breeder thermocouple guide tubes, fuel element supports and stainless steel tubes and flanges. Newman, Hender & Co., Ltd., display a selection of valves for the atomic energy field, including globe and gate valves, needle type bellows-sealed valves and parallel slide valves with seal-weld flanges, all made from forged steel.

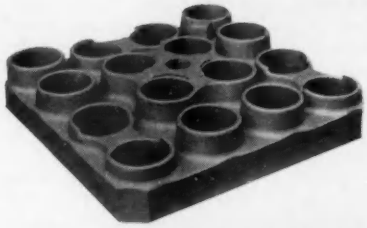
On the stand of Aiton & Co., Ltd., there is a full-size heating unit and ebullition chamber representative of the complete Aiton "Alkacide" plant and evaporator for purifying sea water or estuary water for nuclear power stations. Also on show is corrugated expansion pipework, and pipework for advanced service conditions in both carbon and alloy steel. Vokes, Ltd., Vokes Genspring, Ltd., and Stream-Line Filters, Ltd., are showing a wide range of products for the nuclear industry,



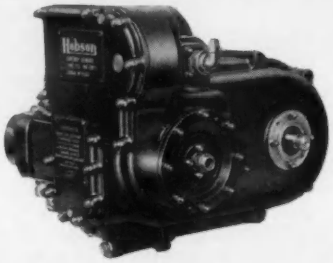
Sperry reactor control rod winding mechanism incorporating d.c. stepping motor



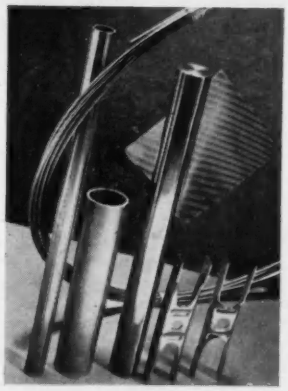
Ferranti "Mercury" computer



A.P.V. reactor guide pan casing in B.S. 592B steel for Hunterston



Hobson multi-ratio gearbox for experimental reactor control



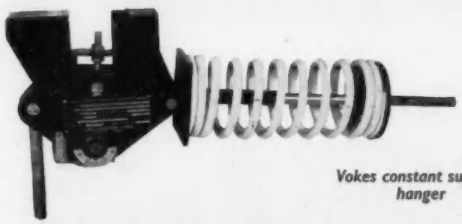
Wrought and finished products, including fuel element support brackets, in I.C.I. zirconium and zirconium alloys

including the latest development in filtration equipment, a range of pipe suspension equipment and special units suitable for filtration, de-aeration and dehydration of insulating and transformer oils.

The exhibits of Crane Packing, Ltd., include polytetrafluoroethylene in the form of extruded rod, tube, tape and film, as well as components such as covered springs, bellows for expansion pieces in pipelines and pressure control instruments. A number of gland packings are being exhibited, examples being those which are designed for use with gases such as UHF_6 or hot CO_2. Altogether 16 mechanical shaft seals are shown, including a 7in diameter seal for hot CO_2 circulation fans, and other smaller seals which have been developed for use on various gas compressors. The exhibits of Nash & Thompson, Ltd., consist mainly of organic scintillators.

The exhibits of Nuclear Engineering, Ltd., illustrate the four main facets of the company's activities. In the medical field there is the new "Mobaltron III" cobalt therapy unit, which is designed for static, multi-port entry and moving field (including oscillation and pendulum) therapy, using radioactive cobalt 60. In the industrial sphere three units of the "Pantatron" range of radiography equipment are shown to illustrate the advantages of the use of gamma radiography. Other exhibits include means of storing radio-isotopes and a full-size model of a chemical irradiation unit, at present being manufactured for a customer.

On the stand of H. M. Hobson, Ltd., are units of reactor controls and ancillary equipment typical of the company's products now in operation at A.E.R.E., Harwell (DIDO and PLUTO), Dounreay (DMTR), and the Australian



Vokes constant support hanger

reactor HIFAR at Lucas Heights. The exhibits comprise a coarse control unit with associated slave gearbox and master gearbox, gearboxes for the fine control and safety rod systems and a multi-ratio gearbox for experimental reactor control. There is also the Hobson-A.E.R.E. honeycomb isotope unit for the manufacture of radioactive isotopes, the Hobson C.R.L. master/slave manipulator for the remote handling of radioactive or toxic materials and "Unibrix" high-density barytes shielding unit bricks for protection walls and hot cells.

On the stand of the Sperry Gyroscope Co., Ltd., is a full-sized display showing the mechanism of a new reactor control rod winding mechanism which incorporates a number of special features designed to ensure safety, reliability and ease of operation and maintenance. Also on the stand is a servo-driven control rod position indicator, which has a presentation combining the general

position of the control rod, its absolute position within 0·1 mm and a " tell-tale " indication of direction of control rod movement and speed. An example is also shown of the recently developed range of d.c. " vernier " or stepping motors.

Scientific Instruments

As one would expect there is a wide range of instruments at the exhibition and the British scientific instrument industry is in fact very well represented. One item which will be of interest to the nuclear physicist is the new Type 412B pulse generator shown by Dawe Instruments, Ltd. This is a general purpose instrument having a wide recurrence frequency range from 25 c/s to 100 kc/s with a pulse width continuously variable from 0·3 μsec to 60 millisec. It may be used for checking the performance of linear amplifiers, scaling units and for setting discriminator bias levels.

There is a very interesting display by Ekco Electronics, Ltd., who have a specially built reactor control panel demonstrating typical examples from their range of instruments for nuclear instrumentation of reactors. The control panel represents part of the control room of a heavy water moderated research reactor. The type N582 nucleonic gauge is demonstrated controlling " screw-down " at each side of a rolling mill, and another transistorised unit, the Type N563 gamma backscatter gauge, is a self-contained portable equipment for measuring the thickness of pipe walls or sheet materials to which access is possible on one side only. The selection of electrometers shown by Electronic Instruments, Ltd., are mostly designed around the " Vibron," which enables new standards of sensitivity and stability to be achieved in measuring very small d.c. currents. Some of these electrometers can measure currents of 10^{-16} A and resistances in excess of 10^{15} ohms. The " Vibron " can also be used as a super-accurate pH meter having a full-scale reading of 0·1 pH.

Among the latest electronic equipment being shown for the first time on the Continent by E.M.I. Electronics, Ltd., is a new hand and clothing monitor, which detects both alpha and beta contamination simultaneously, thus enabling the hand count to be reduced to five seconds. Also shown is a selection of electronic instruments and test equipment, including the WM7 general purpose wide-band oscilloscope which has been developed to meet the specifications of the North American and other world markets.

An interesting item shown by Labgear, Ltd., is a robust scaler/timer with integral print-out facilities capable of 20 kc/s pulse drive. When used with programme unit D4127 it will automate a repetitive counting scheme thus avoiding the probable human error and saving the cost of the operator. The programme unit offers pre-selection of a counting period and also an optical waiting period to cover the operating time of automatic sample changers.

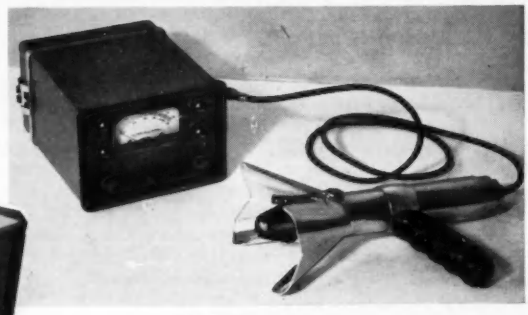
The new master slave remote handling manipulator shown by Pye, Ltd., has a 30 deg lateral displacement mechanism, which can be used with a wide range of nuclear and electronic instruments, and with stereoscopic television or a standard industrial camera. Foot pedals enable the operator to control lateral displacement, TV focusing, and pan and tilt units, without taking his hands from the manipulator controls. An associated company, W. G. Pye & Co., Ltd., is showing a new argon chromatograph, which has a sensitivity 100,000 times greater than the conventional models, a universal measuring microscope and cathetometer which reads to 0·005 mm, a new portable Wheatstone bridge and a stable d.c. amplifier and microvoltmeter with a zero drift of only ± 1 μV per day.

The exhibits of Unicam Instruments, Ltd., embrace a range of spectrophotometers which can be used for the analysis of radioactive materials under remote control.

General Radiological, Ltd., who are specialists in the instrumentation of reactors, are displaying a complete control cubicle of the type designed for the Bradwell nuclear power station. It is fully instrumented and demonstrates the complete range of reactor instruments made by the company, including a complete neutron counter withdrawal mechanism, neutron sensitive ion chambers, foil counting equipment for flux scanning and annular ion chambers for flux plotting.

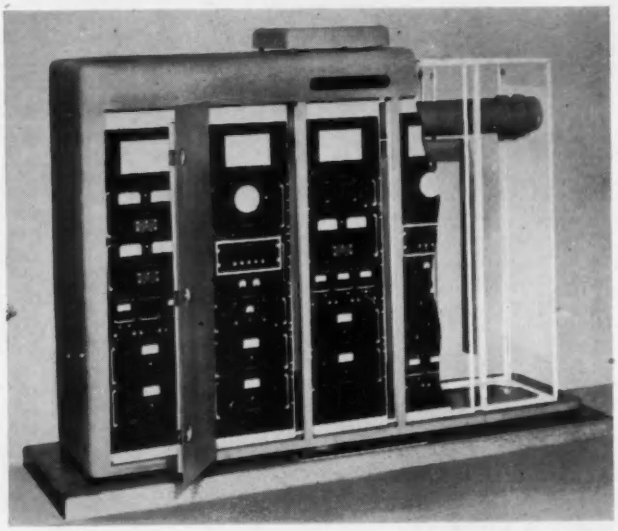
In addition to a wide range of individual instruments for nuclear reactors, Elliott Brothers (London), Ltd., have a working display panel of equipment for the instrumentation and control of a nuclear power plant. There is also a working analogue reactor simulator, designed primarily for instructional purposes, which may be controlled in three ways: manually, by an automatic " on-off " system, or by an automatic proportional system. Trips are incorporated to shut down the reactor automatically should either the power level or period pass

Elliott Brothers reactor simulator

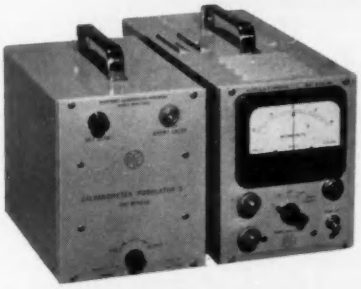


Ekco wall thickness gauge

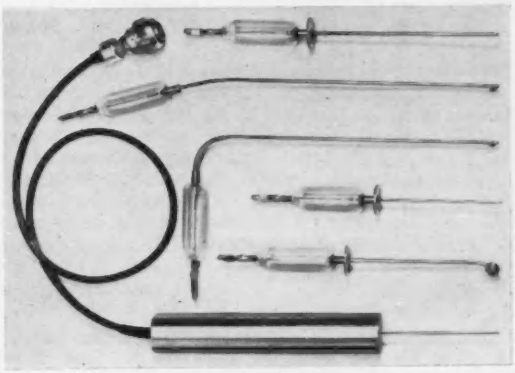
Avo experimental magnetic memory scaling unit and magnetic indicator



General Radiological reactor control cubicle



Pye d.c. amplifier and microvoltmeter



20th Century Electronics needle counters

through the preset limits, and since the simulator provides an accurate indication of reactor behaviour in real time, the effect of varying conditions on reactor operation may be demonstrated.

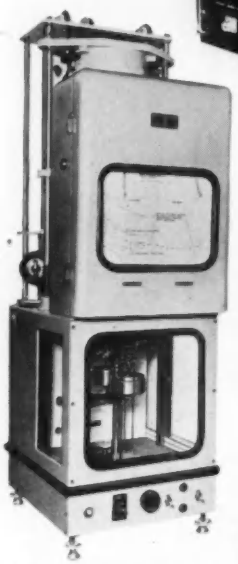
Among the instruments that Negretti & Zambra, Ltd., have developed specifically for atomic energy applications are pressure amplifiers for giving remote readings of small pressure fluctuations, and a gap-measuring probe, using a transmitting capsule built up from diaphragms, which is extremely useful for measuring gaps in positions that exclude the more conventional methods of measurement. In the new range of needle counters shown by 20th Century Electronics, Ltd., the Geiger counter tube is built into a needle which can be inserted into the human body to permit accurate location of the radio-isotope previously introduced.

The magnetic-memory scaling unit, with magnetic indicator, shown by Avo, Ltd., is a small lightweight instrument of extremely low power consumption. It employs minute ferrite magnetic cores as bi-stable elements in a scale-of-ten circuit, and has a new form of magnetic count indicator in which the currents flowing in the scaling circuit magnetise thin strips of nickel-iron mounted around a balanced pair of compass needles. On the stand of Cossor Instruments, Ltd., there are several different models of double beam oscillographs, an oscillograph camera and drive unit, a transistor tester, a 6 V transistorised power unit and a milli-micro-second pulse generator and millo-micro-second pulse test set. Mullard Equipment, Ltd., are showing for the first time a system for initiating warning or shut-down conditions in a reactor when fault signals are received from instruments monitoring the significant parameters of the pile. To prevent a spurious shut-down the system also determines when a fault signal is due to the failure of a monitoring channel. Enhanced reliability is achieved by the use of transistor logic circuits for switching, printed circuits and advanced assembly methods.

Another firm showing a number of recently introduced items on the Continent for the first time is George Kent, Ltd., the main item of interest on whose stand is the "Multelec Mark 3" high-speed electronic strip-chart recorder for such applications as temperature, millivoltage, reactor power-level measurement (both linear and logarithmic); reactor power-drift measurement; gamma health monitoring; gamma activity in fluid circuits; control arm or rod position and analogue computers. One version of the instrument has a multi-point scanner with a new presentation system and is shown recording the readings from 90 individually scanned points on a single chart, with clear identification of each reading.

The thermo balance shown by Stanton Instruments, Ltd., consists of the company's standard balances sur-

Nuclear Enterprises non-overloading linear pulse amplifier



Stanton Instruments thermo-balance for gravimetric research

mounted by a furnace and a twin-pen electronic recorder unit fitted above the balance and in front of the furnace. With these instruments the analyst obtains a visual record of the change in weight of his precipitate side by side with the change in furnace temperature, the rate of heating of which can be controlled. The 1,000 deg C model is now equipped with an improved furnace which shows a smoother furnace control, formerly only obtained on the 1,400 deg C model. These instruments once set up will reproduce and record time, temperature and weight changes for periods up to several days. A radioactive air pollution recorder, an effluent monitor, and a personal radiation monitor are among the instruments shown by Fleming Radio (Developments), Ltd., while Cawkell Research & Electronics, Ltd., are showing on the A.E.A.'s ZETA exhibit an improved model of their multi-channel oscilloscope used for measurements on ZETA at Harwell.

The non-overloading pulse amplifier on the stand of Nuclear Enterprises (G.B.), Ltd., is based on the Fairstein system and is designed to satisfy the needs of the nuclear scientist when using proportional and scintillation counter spectrometers. It is a feedback stabilised amplifier with double differentiation for use primarily for sodium iodide scintillation spectrometers. The rod-speed recorder shown by the Cambridge Instrument Co. is designed for testing the emergency shut-down arrangements of a nuclear reactor. The dynamic characteristics of a falling rod, including the instant of release and of the end of the fall, are recorded on a chart and the test cycle is entirely automatic. Other examples of the company's wide range of instruments with applications in the atomic field are a vibrograph which will measure (and record on a plastic strip) horizontal and vertical vibrations and also, with a special attachment, variations in rotational velocity; and an electro-chemical dissolved oxygen analyser, of the gas-phase transfer type, in which glass components have been reduced to the minimum and built-in facilities are provided for establishing zero and for calibrating at the working point.

After the exhibition the two special power-operated manipulators for the continuous remote handling of spent fuel elements from the Calder Hall reactors, on the stand of Savage & Parsons, Ltd., will be installed in the new "pond" now being built by the A.E.A. at Windscale. It takes about 30 minutes to transfer the 24 elements in a discharge basket on to a rail-borne skip, which is then submerged in water for up to six months to allow the short-lived radioactivity to decay. Each manipulator can handle 30,000 elements a year; the elements are not only highly radioactive but at a temperature of 160 deg C.

MAIN LINE RESIGNALLING

THE first major resignalling changeover in connection with the 25 kV, 50 c/s, electrification scheme has been carried out by British Railways, London Midland Region, on the 9½ mile section of two-track line between Wilmslow and Slade Lane Junction. The colour light signalling includes several novel features, some of which are necessitated by the adoption of 50 c/s electrification. Special protective measures have had to be taken to ensure that all lineside signalling and telecommunications cables and equipment are immune from interference from the traction system.

Power for the signal lamps is taken from the lineside signalling distributor, transformed and rectified at each location. To maintain the signal aspect in the event of a complete power failure or cable fault, a Nife standby battery is provided at each signal. Most signals will normally work automatically, but an overriding control enables the signalman to reset them at danger in an emergency.

To safeguard the signal aspects against false illumination by direct or induced effects of the a.c. traction system, the d.c. signal control relays, which are themselves immune to operation by a.c., are situated in the immediate vicinity of each signal. All signalling circuits are 24 V d.c. and are carried in unscreened multicore cables. To limit the maximum voltage which can be induced in the signalling cable conductors from the parallel traction system to 430 V, all signalling circuits are sectionalised. At each dividing point independent 24 V transformer/rectifier sets are provided to feed in each direction.

Two new types of track circuit equipment specially designed to work under high voltage 50 c/s a.c. traction conditions are employed. The shorter track circuits, up to 500 yd in length, are of the d.c. rectifier-fed single rail type. The rectifier feed unit incorporates a special protective arrangement to prevent a.c. traction return current being rectified and fed back to the rails as d.c. The special d.c. track relay used is immune to operation by a.c. current. The longer track circuits, over 500 yd, are of the 75 c/s a.c. double rail type with specially designed impedance bonds. The 75 c/s current is derived from a static 50/75 c/s frequency convertor for each track circuit. This frequency has been chosen since it can be conveniently generated from the 50 c/s signalling supply and it is not a harmonic of the traction frequency.

High speed Westronic remote control equipment, requiring only one pair of wires between each local relay interlocking and the signal box, is being used for the first time on British Railways. This equipment has been supplied and installed by the Westinghouse Brake & Signal Co., Ltd. Control and indication messages are transmitted simultaneously between the signal box and each local interlocking by means of carrier frequency impulses over one pair of wires. Two different frequencies are used for controls, and two other frequencies for indications, the one selected for transmission being that corresponding to the condition at the local interlocking, e.g. "track circuit clear" or "track circuit occupied." By the use of fully transistorised coding units and carrier frequency transmitters and receivers, high coding speeds are employed. The principle of continuous scanning is used. Approximately three complete scans are sent each second and the total time from the operation of the panel switch in the signal box to the operation of the final relay at the remote interlocking is about 0·6 second.

WORLD POWER CONFERENCE IN CANADA

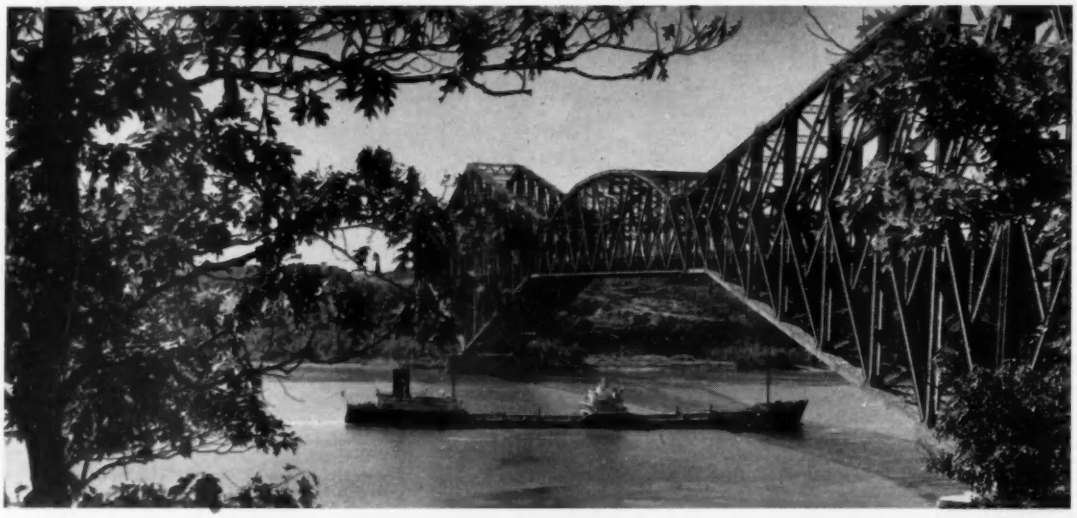
Artist's impression of the St. Lawrence power scheme

AS an appendix to the Canadian Sectional Meeting of the World Power Conference to be held in Montreal from 7th to 11th September (reports of which will appear in later issues), opportunities will be given delegates to see hydro-electric developments in the Provinces of Ontario and Quebec. The most distant expedition will start by private train on the conclusion of the meeting and will end at New York City three days later. The object of the first stop along the route will be to visit the International Section of the St. Lawrence Power and Seaway Project where, near Cornwall, the middle of the river becomes the boundary between Canada and the U.S.A. Between Barnhart Island and the Canadian mainland are two semi-outdoor hydro-power stations, one owned by the Ontario Hydro-Electric Commission and the other by New York State. Each will have an ultimate capacity of 820 MW made up of sixteen generating units. On the following day the programme includes a visit to the Niagara Falls and the Sir Adam Beck No. 2 station (eventual capacity 1,370 MW) with its six 55,000 h.p. reversible Deriaz turbines for use with pumped storage. The final stage will take in Pittsburgh with a view to inspection of the Shippingport nuclear reactor (electrical output 60 MW) which is connected to the system of the Duquesne Light & Power Co.; this type of reactor uses water under pressure as both moderator and coolant and a combination of natural and enriched uranium as fuel. A shorter version of this tour will end at Niagara.

At the same time a limited number of persons can be carried by plane westward of Montreal to the two power stations of the Aluminum Co. of Canada and the Saguenay Power Co.—Shipshaw (900 MW) and Chute du Diable (275 MW)—and the two Bersimis stations of the Hydro-Electric Commission of Quebec with ultimate capacities

The map on the left shows the various tours available to delegates

The Shipshaw generating station



The Quebec Bridge, which spans the St. Lawrence River, about seven miles above Quebec City

of 900 and 625 MW. No. 1 is of underground construction and contains water turbines of 175,000 h.p., the largest yet in operation anywhere. A one-day post-conference bus trip will include visits to two hydro-stations and system of the Shawinigan Water & Power Co. During the conference itself whole or half-day local excursions will be made.

Annual Report

In its annual report the World Power Conference lists 52 member countries and territories. The eleventh sectional meeting, in Belgrade last year, was attended by 1,208 persons (including Government representatives) from 48 countries, 32 of which presented through their national committees 204 papers in one of four languages with summaries in all of the four.

Further to the Canadian sectional meeting this month, another of similar status—in Madrid—will be held in 1960 prior to the six-yearly full W.P.C. in Australia in 1962. Future arrangements include a sectional meeting in Switzerland in 1964. The report shows the extent of co-operation with other international bodies interested in energy sources.

The accounts of the International Executive Council (Central Office Maintenance Fund) indicate an excess of expenditure in 1957 (£4,323) over income of £229, one non-recurrent item in which was the expense of establishing the claim of the W.P.C. to be a "charity" and hence free from United Kingdom taxation. The president of the World Power Conference is Mr. Franz Holzinger (Austria). The International Executive Council comprises Sir Vincent de Ferranti (chairman), Sir Harold Hartley (hon. chairman), the three vice-chairmen—Mr. Gail A. Hathaway (U.S.A.), Mr. C. Milicevia (Yugoslavia) and Maj.-Gen. H. A. Young (Canada) and the secretary, Mr. C. H. Gray, 201-2, Grand Buildings, Trafalgar Square, London, W.C.2.

Cathodic Protection in Nigeria

A SURVEY indicated severe corrosion of the underwater steelwork of the Carter bridge at Lagos and an extensive repair and replacement programme, designed by Coode and Partners, consulting engineers, was recently put in hand by the Nigerian Federal Public Works Department. This involved the installation of a cathodic protection scheme by Metal and Pipeline Endurance, Ltd., under the direction of the consulting engineers.

This bridge, which provides the only highway between the mainland and Lagos island, is some 2,350ft long and carries a 38ft wide motor roadway flanked by a 10ft wide walkway on either side. Apart from two navigable spans, providing clear waterways of 85ft each, the substructure of the bridge consists of several hundred closely spaced cast iron and cast steel screw piles, braced with struts and tie rods of mild steel. Due to the very large area of exposed, underwater steelwork requiring protection, only the impressed current method of cathodic protection was considered, as an obviously prohibitive quantity of galvanic anode material would have been required. The total installed capacity of the scheme is 800 A, this being in the form of four 200 A d.c. output, three-phase, 400/440 V, 50 c/s input, transformer-rectifier units. Transformers and rectifier plates are oil immersed and the units are fitted with cooling tubes. Control of the d.c. output is by means of three rotary tapping switches, and visual indication of the output is provided by an ammeter and voltmeter on each unit.

On each transformer rectifier there are four single-core positive output cables which are run to the bed of the lagoon, through 2in galvanised piping, and thence to four anode groups. Thus there are a total of 16 anode groups or "groundbeds," the anodes consisting of resin-impregnated graphite rods. The anodes in each group are connected to a ring main cable via waterproof insulated junction boxes, these being moulded in blocks of bitumen. The two ends of each ring main are finally connected to the positive output cables by means of specially designed unplasticised p.v.c. compound filled junction boxes. The anode groups are situated some 50 yards from the bridge on the down-stream side and lie approximately at right angles to the line of the bridge. The negative terminal of the d.c. output is connected to the steelwork of the bridge by means of insulated cable.

VIEWS on the NEWS

By REFLECTOR

HITHERTO it has been the Government's policy, mainly to reassure the public, to insist that nuclear power stations shall be situated well away from populous areas. Implementation of this policy has brought protests from amenity societies and individuals who contend that all the stations so far under construction or projected will interfere with the natural beauties of the districts in which they are placed. The Government's cautious policy extended to the U.S. submarine *Nautilus* which was not allowed to sail up the Thames to London. This caution is not shared by the local authorities of the areas in question who welcome the construction of the stations as a means of solving their unemployment problem. In fact, as I have mentioned previously, many municipal bodies and other interested parties are clamouring for nuclear power stations. The latest manifestation of this spirit is reported in the *Chatham Observer*. Mr. A. Bottomley, M.P. for Rochester and Chatham, has suggested that a site could be found in the Medway area for a nuclear station, instead of at Dungeness which has already been "earmarked." He suggests that the Hoo Peninsula might be chosen as not being too near the Medway towns although within fairly easy reach. Mr. Bottomley considers the potential risk to be negligible.

* * *

So much has been said of the iniquities of amateur electricians that it is not surprising that one of their number has risen to their defence. In a letter to the Manchester *Evening Chronicle*, "Amateur Wireman" says:—

> "There is always talk about 'complying with the regulations.' The amateur cannot buy a copy of these regulations, and even the electrical trade admit they don't understand many of them. The Electricity Board has so infuriated people by its absurd demands, especially when a house changes hands, that everyone now tries to outwit it. When I bought my house, only 20 years old, the Board insisted it must be re-wired throughout, and though my electrician said it was quite unnecessary, it had to be done."

What was "Amateur Wireman" doing with an electrician? If the latter was looking for work he should have agreed with the Board, which was probably justified in advising (not insisting upon surely!) the re-wiring of the house.

* * *

Electricity undertakings in Great Britain, which need a lot of water, occasionally get into trouble with river authorities and others. The discharge of cooling water by thermal power stations is said to "pollute" rivers, although the pollution is indirect; the slight rise in the temperature of the water may encourage plant growth. And sometimes the river fish are said to suffer harm. Fish are also involved in hydro-electric development and special provisions are often made for them. Now, in the United States, another problem presents itself to hydro-electric authorities. In a recent paper Dr. D. W. Pritchard, of the Johns Hopkins University, Baltimore, says that the oxygen content of water impounded for turbine use is lowered. Mainly in summer, the top water in dams becomes warmer than that at lower levels. This temperature gradient restricts the mixing of water from different levels and prevents the re-aeration of the lower water. As this is the water generally taken from the dam, only water of low oxygen content passes through the turbines. Aquatic life needs dissolved oxygen if it is to survive, and so this de-oxygenisation is considered to be harmful. One remedy suggested is to raise the level of the turbine intakes. I should have thought that the water would be pretty well aerated in passing through the tail race.

* * *

Portable electric tools which are either unearthed, or whose earthing is faulty, are frequently the cause of trouble. But there is also possibility of danger in portable lamps which are more often used in the home. At a recent inquest it was disclosed that a man using a lamp on a long flex while he was taking up some floor boards received a fatal shock. An engineer of the London Electricity Board gave evidence that he had tested the lamp (which was still connected to a lighting pendant) and found that the insulation of the flex was in bad condition immediately behind the brass lampholder, leaving the conductors exposed. "It was not earthed and could not be," he said. It is very unlikely that these lamps (when used in a house) are ever earthed or even that "Home Office" shielded lampholders are employed.

* * *

With the second "Atoms for Peace" conference now in progress at Geneva it is appropriate to refer to the obituary notice of Henri Becquerel which appeared in the *Electrical Review* of 4th September, 1908—fifty years ago:—

> "M. Becquerel was permanent secretary of the Academy of Sciences, and rendered his name immortal by the discovery of the invisible radiation from uranium and its compounds known as the Becquerel rays. This discovery, at first sight of no great importance, when followed by M. and Madame Curie, who were pupils of Becquerel's, led to the discovery of radium and radio-active compounds. The mathematical genius of J. J. Thomson revealed the true explanation of these new phenomena, which illustrated and confirmed his own contemporaneous discovery that the cathode rays represented fragments of broken up atoms. Becquerel's discovery was the starting point of a new departure in physical science which has led to a great and unexpected addition to our knowledge of molecular physics."

I.E.E. CENTRE CHAIRMEN

Men Who Will Preside in the Provinces During 1958-59

Mr. D. E. Lambert

IN our last issue we published biographical notes of the chairmen of the specialised Sections of the Institution of Electrical Engineers for the 1958-59 Session. We now give below similar particulars of some of the men who will preside over the activities of the provincial Centres, and we hope to publish biographical notes of the remainder in a later issue.

Mr. D. E. Lambert, B.Sc.(Eng.), M.I.E.E., M.Amer. I.E.E. (East Midland) has been manager of the switchgear division of the Brush Electrical Engineering Co., Ltd., since October, 1955, before which he was for thirty years with A. Reyrolle & Co., Ltd. After some works experience, he was a member for many years of the Technical and Research Department of A. Reyrolle & Co., and in 1940 became assistant technical manager of the company as well as personal assistant to the managing director. He was also manager of the British Short-Circuit Testing Station from 1940, and in this capacity was a member of the A.S.T.A. Council and the Management Committee. From 1948 he was engineer-in-charge of technical co-ordination and was responsible for standardisation, being a member of many B.E.A.M.A. and B.S.I. Committees. He is at present chairman of two B.S.I. Switchgear Committees and also of the Low-Voltage Switchgear Committee of the I.E.C.

Mr. Lambert was joint author of a paper to the I.E.E., which received the Llewelyn Atkinson Premium, on standardisation of switchgear. He has also presented papers to the Institution of Danish Civil Engineers, the Association of Dutch Power Station Engineers, and the Electrical Power Engineers' Association. He was chairman-elect of the I.E.E. North Eastern Centre in 1955, but relinquished this position on going to Loughborough.

Mr. J. Ashmore, M.I.E.E., Associate I.Mech.E., Fellow Amer.I.E.E., Fellow A.M.E.M.E. (South Midland) is the district manager, Birmingham, of British Electrical Repairs, Ltd. He served his apprenticeship with the British Westinghouse Co., and received his technical education at the College of Technology, Manchester, and the Royal Technical College, Salford. During the 1914-18 war he served in the Royal Engineers, Signal Service, Wireless Section, and saw active service in France. He joined the British Engine Boiler & Electrical Insurance Co., Ltd., in 1919, as an engineer surveyor, and commenced his association with British Electrical Repairs, Ltd., in 1923. He is a past chairman of the Supply and Utilisation Group of the I.E.E. South Midland Centre and has served on the Centre Committee for two periods; he has also served on the Committee of the Education Discussion Circle. Mr. Ashmore is a past president of the Birmingham Electric Club and was hon. treasurer of the Birmingham Centre of the I.E.S. for eleven years. He has contributed to the technical Press and read papers before the I.E.E., the I.E.S., the Birmingham Electric Club and other bodies.

Mr. J. Ashmore

Mr. G. Bishop

Mr. J. Collins

Mr. G. Bishop, B.Sc., M.I.E.E. (Southern) is a principal scientific officer in H.M. Underwater Countermeasures and Weapons Establishment, Havant. His education was received at Redland Hill House, Bristol, and at the University of Bristol, where he obtained the degree of B.Sc. in electrical engineering with first division 2nd class honours. He served two vacation apprenticeship courses with the British Thomson-Houston Co., Ltd., and later joined Siemens Brothers & Co., Ltd., Woolwich, where he served a student apprenticeship in the Telephone Department, later becoming junior engineer in the Telephone Traffic and Planning Section. Mr. Bishop joined the Admiralty at H.M. Signal School, Portsmouth, in 1929 as a junior technical officer, and from 1940 to 1946 was employed on the design and development of the first S-band radar equipments used for the detection of enemy submarines and later on P.P.I.'s and other display apparatus used with these equipments. He was transferred to the Admiralty Mining Establishment, Havant, in 1946 where he was responsible for the control and firing of the anti-submarine weapon "Limbo." As principal scientific officer in H.M. Underwater Countermeasures and Weapons Establishment, he has in recent years been engaged on work in connection with minesweeping.

Mr. J. Collins, M.I.E.E. (Mersey and North Wales) is commercial manager of the Liverpool and Netherton Works of the English Electric Co., Ltd., which he joined as a student apprentice at Preston in 1930. He received his education at Blyth Grammar School and Bradford Technical College, and gained further experience at the English Electric Bradford works, subsequently becoming change-of-frequency engineer at the Newcastle and Birmingham offices. Later, after service as a contract engineer at Stafford, he went to the London office as a technical representative and then to the Bradford branch office. He joined the staff of the chief commercial manager at Stafford in 1947 and took up his present position in 1948.

Metropolitan Line Electrification

WORK has started on the electrification of the 10-mile section of the Metropolitan Line from Rickmansworth to Amersham and Chesham which is scheduled for completion in the summer of 1960. Metropolitan trains are now hauled by electric locomotives to Rickmansworth, where steam engines take over.

PERSONAL AND SOCIAL

News of Men and Women of the Industry

The South Wales Electricity Board has appointed six more district managers in furtherance of its plan for introducing "single-headed" management in each of its Districts. The new managers will take up their duties on 1st October.

Mr. A. L. Barnett is to be responsible for the new District of Brecon, which has been created by the amalgamation of the three District organisations hitherto serving part of Monmouthshire in the Abergavenny area and the counties of Brecon and Radnor. Mr. Barnett has been district commercial manager for the Monmouth and Chepstow District of the Board since 1949, when the administration of this area was transferred from the Midlands Electricity Board to the South Wales Board. Before nationalisation Mr. Barnett was manager of the Chepstow District of the former West Gloucestershire Power Co.

Mr. L. Benallick, Associate I.E.E., who has been engineer for the Swansea District of the Board since 1948, will control the existing Neath District. He commenced his service in the industry in 1926 with the former Swansea Corporation Electricity Department, with whom he held various appointments until he entered the service of the Board.

Mr. A. C. Davies, M.C., A.M.I.E.E., the new manager for the Pontypridd District, which will retain its present boundaries, has been district engineer for the Ely and Rhondda District of the Board since December, 1956. He entered the industry in 1937 when he became an apprentice with the former South Wales Electric Power Co. He served with the Royal Engineers in the last war. Shortly after vesting date he was appointed assistant district engineer in the Barry District of the Board, a position he held until October, 1949, when he was appointed district engineer of the Abergavenny and Monmouth Districts.

Mr. H. B. Holloway, B.Sc.(Eng.), A.M.I.E.E., who is to be manager of the existing Pontardawe District, has been senior assistant (industrial supply) in the Commercial Department of the Cardiff and East Central Area of the Board since May, 1955. Mr. Holloway started his service in the industry in 1936 with the former Cardiff Corporation Electricity Department. He was appointed first assistant to the district commercial manager of the Cardiff East District in 1949, where he remained until 1954 when he was appointed district commercial manager for the Rhondda District of the Board.

Mr. G. J. Hughes, B.Sc.(Econ.), A.M.I.E.E., who, as district manager for Pontypool, takes over control of the two District organisations at present serving the industrial areas around Pontypool and the eastern area of Monmouthshire, has been senior assistaht (low voltage supplies) in the Board's Monmouthshire and Mid-Wales Area since November, 1953. He entered the industry in 1936 and after service with the former Northmet Power Co. and the Eastern Electricity Board he was appointed district commercial engineer in the Reigate District of the South Eastern Electricity Board in 1952, a position he held until going to South Wales.

Mr. B. Jones, Associate I.E.E., who is to take charge of the Barry District, has been commercial manager of that District for the past ten years. He commenced his service in the industry shortly after the 1914-18 war and, immediately before vesting date, was manager of the Bedwellty U.D.C. electricity and gas undertakings at Blackwood.

The British Transport Commission recently announced the appointment of **Mr. R. C. Bond,** at present chief mechanical engineer, British Railways Central Staff, as technical adviser at headquarters, to succeed **Mr. J. Ratter,** who will become a member of the Commission on 1st October. The Commission now announces that it has decided to amalgamate the present Mechanical and Carriage and Wagon Engineering Departments in the British Railways Central Staff at headquarters under one officer with the title of chief mechanical engineer and to appoint to this post **Mr. J. F. Harrison,** M.I.Mech.E., M.I.Loco.E., at present chief mechanical and electrical engineer of the London Midland Region of British Railways. Mr. Harrison will be succeeded as chief mechanical and electrical engineer in the London Midland Region by **Mr. A. E. Robson,** M.B.E., M.I.Mech.E., at present chief carriage and wagon engineering officer, British Railways Central Staff. These changes will take effect from 1st October.

Mr. L. Benallick

Mr. H. B. Holloway

Mr. G. J. Hughes

Mr. J. J. Cross, A.M.I.E.E., has been appointed managing director of John J. Cross (Electrical), Ltd. Before joining the company Mr. Cross was managing director of Edward Dewhurst, Ltd., with whom he received his early training, later becoming estimating engineer. During the last war Mr. Cross served in the Royal Corps of Signals.

Mr. J. J. Cross

Sir James Gray, professor of zoology at Cambridge University, has been elected president of the British Association for the Advancement of Science, in succession to **Sir Alexander Fleck.** Sir James takes office next January.

Mr. G. Campbell, B.Sc., A.R.C.S.T., F.R.I.C., A.M.I.Mech.E., has been appointed general manager of the Chemical and Metallurgical Division of the Plessey Co., Ltd. He was previously technical manager and deputy general manager of the company's Towcester plant. A graduate of Glasgow University with first-class honours in chemistry and metallurgy, Mr. Campbell joined the company in 1945 and became head of laboratories of the Swindon Division and later pilot plant manager at Towcester.

With reference to the notice regarding the appointment of **Mr. D. W. Minshull,** B.Sc., M.I.E.E., as general manager of the Power Cables Division of British Insulated Callender's Cables, Ltd., which was published in our issue of 22nd August, the company now informs us that Mr. Minshull is a director of British Insulated Callender's (Submarine Cables), Ltd., and not deputy chairman, as stated in the notice previously issued.

Members of the Radio and Telecommunication Section of the **Institution of Electrical Engineers** visited Taplow Court, the home of British Telecommunications Research, Ltd., an organisation sponsored jointly by the Automatic Telephone & Electric Co., Ltd., and British Insulated Callender's Cables, Ltd., on 19th July. A wide range of group activities was on display, the main exhibition being

accommodated in a marquee. Sir Archibald Gill, chairman of B.T.R., Ltd., and Lady Gill were the hosts, Sir Archibald formally welcoming the visitors at lunch on behalf of the group. Dr. J. S. McPetrie, chairman of the Section, replied for the I.E.E. Lunch was followed by a river trip along the reaches which border Taplow Court and the adjoining estate of Cliveden. "Open house" at B.T.R. continued until 7th August, by which time more than 800 guests, including members of associated companies, the Post Office and military services, visited the exhibition.

We report on page 419 the formation of Brook Electric Motors of Canada, Ltd. The director and vice-president of the company is **Mr. A. E. Hogton,** who has held a similar position with the Brook American subsidiary in Chicago for the past year. Mr. Hogton was formerly in control of production and planning at Huddersfield and has been with the company since 1917. **Mr. H. W. Lumb,** who

Mr. A. E. Hogton

Mr. H. W. Lumb

will handle sales, commenced with Brook Motors in 1950 and he has been technical sales engineer at the Leeds sales office since 1954. **Mr. R. Booth** will have charge of the commercial and office organisation. He has been with Brook Motors since 1946 and for the last two years has been estimating controller and assistant to the export manager at Huddersfield.

The Ministry of Supply announces that **Dr. J. S. McPetrie** has been appointed Director-General of Electronics Research and Development in succession to **Dr. D. H. Black,** C.M.G.

Mr. R. C. Golding, editor of *Modern Power and Engineering,* Toronto, is visiting this country between 20th September and 8th October. His address will be 140, Highlands Boulevard, Leigh-on-Sea, Essex. Before going to Canada in 1951 Mr. Golding was construction engineer with the Eastern Electricity Board, having previously been manager of the Southend-on-Sea municipal electricity undertaking.

South Wales Switchgear, Ltd., announces that **Mr. A. S. Phillips,** M.I.E.E., has been appointed to represent the company's interests in the South Wales area. Mr. Phillips was for a number of years with the Shanghai Power Corporation and on returning to this country in 1938 joined Bruce & Partners (Engineering Consultants), Ltd., as chief electrical engineer. He is a past chairman of the West Wales (Swansea) Sub-Centre of the Institution of Electrical Engineers and is at present a member of the Western Centre Committee.

Mr. A. S. Phillips

Mr. R. Booth

The Liverpool and Netherton Works of the **English Electric Co., Ltd.,** were visited recently by a party of twenty-five Russian engineers. The visitors were greeted on arrival by Mr. J. Collins, commercial manager, who referred to the company's many associations with Russia and the generation and transmission equipment which it has supplied.

Mr. F. C. Lant, O.B.E., M.Inst.F., A.M.I.H.V.E., has been appointed chief fuel engineer at the Ministry of Power in succession to **Rear-Admiral Sir Sydney O. Frew,** K.B.E., C.B., who has retired from the public service.

Mr. W. L. Baker, manager of the Metal Finishing Division of the Pyrene Co., Ltd., has retired after 30 years' service with the company. He is succeeded by **Mr. H. A. Holden,** M.Sc., A.R.C.S., D.I.C., A.I.M., who has had many years' experience in the Division. **Mr. H. F. Parshall,** M.A., T.D., who has been with the company for some 20 years, continues as director in charge of the Division.

Two new appointments are to be made this month in the Home Economist team of the English Electric Co., Ltd. **Miss Dorothy M. Hawes,** who will take charge in the company's demonstration kitchens and showrooms at Queens House in London, has spent the last three years as a home service adviser in South Africa; previously she was a demonstrator with the South Eastern Electricity Board. **Miss Judy Ackroyd,** who will be joining the company's Leeds office, has been with the Yorkshire Electricity Board for the past two years.

"ELECTRICAL WHO'S WHO"

There are nearly 8,000 entries in the new edition of the "Electrical Who's Who," which covers people in all branches of the industry and profession. Copies can be obtained, at 27s 6d (plus 1s 6d postage), from Electrical Review Publications, Ltd., Dorset House, Stamford Street, London, S.E.1

OBITUARY

Dr. E. Lawrence.—The death occurred in California on 28th August of Dr. Ernest Lawrence; he was fifty-seven. Dr. Lawrence was a leading worker in the field of nuclear physics and in 1937-38 developed and constructed at Berkeley, California, the first cyclotron, which was described by Dr. T. F. Wall in the *Electrical Review* of 8th July, 1938. Dr. Lawrence was awarded the Nobel Prize for Physics in 1939 and among the many other honours which he received was the Hughes Medal of the Royal Society. He took part in the recent international conference in Geneva on the scientific detection of nuclear explosions.

Mr. P. S. Heath.—The death occurred on 30th August, after a short illness, of Mr. Percy S. Heath, Associate I.E.E., managing director of W. G. Heath & Co., Ltd., Plymouth.

Mr. E. A. Workman, of Workman, Reed & Co., Ltd., died on 24th August. With Mr. F. E. R. Reed he founded the company in 1937, before which he represented Petters, Ltd.

Mr. A. C. Hawer, who died on 29th August at the age of 69, retired in 1954 from the position of sales manager, East Anglia area, for Laurence, Scott & Electromotors. Mr. Hawer joined the company in the switch works drawing office in 1905. He left in 1921 and spent some years with the English Electric Co. and the British Thomson-Houston Co. on switch and control gear design but rejoined Laurence, Scott in 1932 to take charge of East Anglia sales.

The late Mr. A. C. Hawer

Mr. H. Turnbull, M.I.E.E.—The death occurred at Torbay Hospital on 30th August of Mr. Herbert Turnbull, of Newton Abbot, who had been a member of the Institution of Electrical Engineers since 1907.

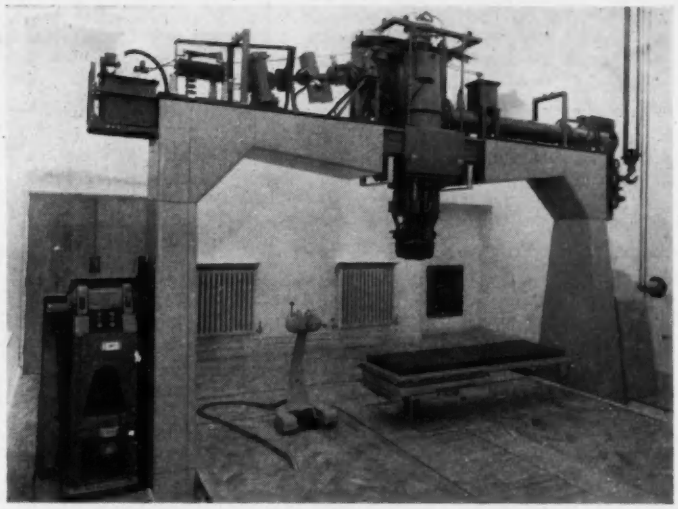
Mr. E. W. Bussey.—A memorial service to the late Mr. E. W. Bussey, C.B.E., a member of the British Electricity Authority from vesting day until 1952 and formerly general secretary of the Electrical Trades Union, will be held at St. Martin-in-the-Fields, London, on Tuesday next at noon.

WILLS

Mr. W. Yuille, managing director of William C. Yuille & Co., Ltd., electrical wholesalers, who died on 31st October last, left personal estate in England and Scotland valued at £12,585.

Mr. L. F. Brookman, director of Ross Courtney & Co., Ltd., who died on 18th December last, left £34,693 gross (£34,554 net).

DEEP X-RAY TREATMENT



Mullard 4 MeV linear accelerator: general view with covers removed

DESIGNED for the X-ray treatment of deep-seated tumours, a four million electron-volt gantry-mounted linear accelerator has been installed in the new radiotherapeutic unit of the Clatterbridge General Hospital, Bebington, Cheshire. The X-ray output of a 4 MeV accelerator, which is over ten times greater than that of the commonly used 200-250 kV therapy units, gives increased penetration, causes almost no skin damage, and reduces treatment time. This accelerator is fundamentally similar in design to the equipment already installed in Newcastle-on-Tyne General Hospital but incorporates a number of significant technical and operational improvements. Chief of these is the provision for employing arc and rotation therapy, as opposed to the more common stationary-field technique. The accelerator will also be used for electron therapy.

For arc therapy, the gantry is rotated so that the X-ray beam describes an arc over the treatment area. Thus, the total skin dosage is spread over a relatively large area and larger doses can be administered without the need for setting-up a series of multiple fields; and the possibility of skin damage is minimised. To ensure that the correct dose is delivered in the required gantry angle, the variable speed d.c. motor which rotates the gantry is servo-controlled from the X-ray output of the accelerator. For rotational therapy, which, broadly, has the same advantages as the arc technique, the treatment couch is rotated about its vertical axis, over which the tumour is positioned. Rotation is entirely automatic and is servo-controlled from the X-ray output of the accelerator.

The accelerator also has facilities for the direct application of electrons for therapy. Electron therapy could be useful in the treatment of surface lesions, since electrons having an energy of 4 MeV are completely absorbed at a depth of about 2 cm below the skin and there is consequently no risk of damage to healthy tissue below the tumour.

Basic Principles

The principle of operation of the Mullard linear accelerator is basically as follows: a magnetron produces a succession of high energy bursts of short radio waves as in a high-power radar transmitter. These waves are used to accelerate a beam of electrons down a specially designed copper tube. This tube is iris-loaded to form a corrugated waveguide down which the electrons are caused to travel with the waves and extract energy from them. The electrons enter the waveguide, which for the 4 MeV machine is 1 metre long, at low velocity, and they leave it with a velocity of 99·3 per cent of that of light. As a result of the considerable dependence of mass on velocity at such high velocities, the electrons are then eight times heavier than their rest mass. When these very fast electrons are stopped suddenly by a heavy metal target (in the present installation it is gold, with water cooling) they produce very hard (short-wave) X-rays, which are then collimated by the X-ray head.

Earlier improvements in the design of waveguide systems made possible the construction of a 4 MeV accelerator sufficiently compact to be carried in a movable gantry of practicable dimensions. More recently, still further improvements, particularly in the design of the corrugated (accelerating) section of the waveguide, have resulted in higher X-ray outputs with units of the same dimensions. The accelerator and its associated control equipment were developed and built by the Mullard Research Laboratories on behalf of the contractor to the Ministry of Health, Philips Electrical, Ltd. These two firms were also responsible for the Newcastle installations.

T.U.C. at Bournemouth

IN his presidential address to the Trades Union Congress at Bournemouth on Monday Mr. T. Yates spoke of the damage to trade unionism which resulted from large-scale unofficial strikes. These, he said, brought the movement into disrepute and sapped the strength of the organisation. Only the trade union movement itself could tackle unofficial strikes and discipline those members who were "bad shipmates."

On collective bargaining, he said that this would never function efficiently without the sincere concern of employers that it should and the determination of the Government to provide the climate in which it might do so. It was no way to negotiate to say in advance that there would be no wage increases, nor did it help confidence in arbitration when advice loaded against the unions was clearly directed at those whose sole responsibility should be to decide on the merits of the case before them.

Mr. Yates said he believed that the unions had been right to insist so much and so often on the need for full employment and on a plan for prosperity. They knew the dangers of inflation well enough, but they also realised the appalling consequences of economic stagnation. Trade unions had never been unwilling to co-operate in efforts to raise industrial efficiency, for the fatter the national income the more they could benefit. It was true that they had their terms for co-operation, but these were modest and reasonable.

Sir Vincent Tewson announced that affiliated membership at 31st December, 1957, was 8,337,325 in 185 organisations.

When the chairman of the General Purposes Committee reported a number of changes in union delegates, Mr. W. Padley (Union of Shop, Distributive and Allied Workers) referred to the substitution of Mr. W. P. Blair for Mr. L. Cannon, an ex-Communist, in the Electrical Trades Union delegation. Mr. F. Foulkes, general president, E.T.U., protested that there had never been any question of an organisation's right to decide who should represent them, and Mr. Yates ruled Mr. Padley out of order.

LETTERS TO THE EDITOR

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents.

Fault Path Impedance

REFERRING to Regulation 406 of the I.E.E. Regulations for the Electrical Equipment of Buildings, 13th edition, in his article on "Fault Path Impedance Measurements" published in your issue of 15th August, Mr. A. J. Baggott says that on the occurrence of an earth fault a current shall flow corresponding to three times the rating of the protecting fuse.

The basic condition laid down in the Regulation is that, on the occurrence of a phase to earth fault of negligible impedance, a current can flow corresponding to three times the rating of the protecting fuse. This initial condition will provide a yardstick for the effectiveness of the earth return path. It is impossible to estimate the current which might flow under actual fault conditions since the fault could be of high impedance.

Mr. Baggott also states that the I.E.E. consider it advisable to limit the maximum sustained voltage developed on the consumer's earth to 40 V r.m.s. I assume that he makes this inference from Regulation 406, Note 1. Mr. Baggott develops his interpretation of Note (1) by quoting maximum values of earth impedance related to various operating values of earth current.

This note to the main Regulations has caused much confusion. It states clearly, however, that any sustained voltage measured between exposed metal required to be earthed and the consumer's earth terminal should not exceed 40 V r.m.s. The inference from this is that the impedance of the earth continuity conductor should be maintained at a low value.

I should like to state my own views on Regulation 406 and Note (1).

I assume that the fault current value of three times the rating of the protecting fuse has been chosen to provide a factor of safety since:—(1) Fusing factor is not a constant for all types of fuses of the same current rating; (2) As every fuse has an inherent time characteristic the time taken to isolate a fault will vary in indirect proportion to the value of current flowing; (3) Should the fault impedance be large on account of either a partial fault or fault which includes part of the impedance of an appliance, the earth-circuit current will possibly decrease to a limiting value of operational current which is the minimum fusing current of the particular circuit fuse.

Note (1) refers to a sustained fault condition. The sustained condition will arise when the fault current decreases to a value less than the minimum fusing current of the protecting fuse. As pointed out already, although there may be compliance with the main regulation, under fault condition the value of earth leakage current might be considerably less than three times the current rating of the fuse. Should this value be less than the minimum fusing current the fuse will not blow. In this event there could exist:—(A) a sustained voltage between the exposed metal of the faulty apparatus and the consumer's earth terminal, and (B) a sustained voltage between the consumer's earth terminal and the general mass of the earth. Note (1) refers to voltage (A).

The figure of 40 V r.m.s. gives an indication of the maximum value of the earth continuity conductor impedance permitted under different fault conditions.

Perhaps this Regulation should have included a further note giving an upper limit to voltage (B).

Glasgow, E.2. ROBERT DALZIEL, A.M.I.E.E.

Incendiary Lamps

YES, I do think that "Reflector" is being a little too sceptical in his comments on the fire prevention officer's report which is referred to in the second paragraph of his column (29th August).

I recently witnessed an incident which in some measure substantiates the fire prevention officer's opinion. While sitting in the lounge an electric lamp exploded and the glass filament stem fell on to a coffee table on which some sewing had been placed. I have no doubt that a fire would have occurred had not the offending object been removed quickly, for the stem was too hot to pick up by the fingers and it was necessary to use fire tongs to do it.

"SCORCHED FINGERS."

Conquest of the Atom

IN the report on the Mullard film given in the *Electrical Review* of 18th July, page 104, it is stated that "In 1919 Rutherford split the nucleus, turning nitrogen into oxygen, etc." I think the latter part should read "producing hydrogen from nitrogen by α-particle bombardment" (see *Phil. Mag.* 1919, 37,587).

Chelmsford. (DR.) L. H. CALLENDAR, F.I.H., F.R.I.C.

Inadequate Wiring Systems

OF course Mr. Thacker is right in that any system which provides for easily installed light duty outlets will make for more adequate systems, but my objection to the multiple socket is that it can be used as a substitute for properly distributed points, as in the case I instanced. However, as the New Day socket does not comply with present I.E.E. Regulations the problem is still with us.

Mr. Thacker should also bear in mind that most house owners have little say in the number of points in their new house beyond paying, as "extras," any sum which the builder may choose to demand for the additional points. The only reason why millions of householders in this country are being denied the benefits of "electrical living" is that installations to existing regulations are too costly. Reduce the cost and you will find that builders will put in adequate installations as an added attraction to sell their houses without further ado.

This brings us to Mr. H. C. Cooper's installation which provided points galore and now we are told has several rings yet still cost very little more than a one 13 A plus several 2 A sockets per room installation. Also despite solid floors and presumably concealed wiring with attendant protection his contractor would have no difficulty in connecting-in an extra socket. The secret which

is evidently contained in the cloth-bound copy of the Wiring Regulations is not to be made available to we lesser mortals who can only afford the paper-backed version.

Perhaps the clue to the whole business is contained in his reply to my query why adequate installations are just not being installed: he does not know but regards the situation only as humorous. In my original letter I voiced the suspicion that those professionally concerned were not really interested in bringing the benefits of electricity to others. If Mr. Cooper's attitude is to be regarded as typical your readers will be able to judge how well founded these suspicions are.

Maidenhead, Berks. B. RAYNOR.

ATOMIC ENERGY CONFERENCE

Opening Proceedings at Geneva

AT the opening session on Monday the 5,000 delegates and observers from 81 countries attending the second United Nations Conference on the Peaceful Uses of Atomic Energy at the Palais des Nations, Geneva, were formally welcomed by M. Thomas Holenstein, President of the Swiss Confederation, and by Mr. D. Hammarskjöld, secretary-general of the United Nations Organisation, Mr. Stirling Cole, director of the International Atomic Energy Agency, and Dr. Candau, director-general of the World Health Organisation.

The official proceedings then began with the presidential address delivered by Professor Francis Perrin, High Commissioner of the French Atomic Energy Commission, who said that although atomic energy had appeared to many under-developed countries as a sort of royal road to prosperity it could only play an important part in the near future in those Western European countries which were already highly industrialised and had insufficient traditional power resources to enable them to pursue their development. The United States and Soviet Russia had only to prepare to use atomic energy on a large scale in the more remote future when probable technical advances would have made it more economical than energy produced by cheap coal or ample water power.

Under-developed countries could not, it would seem, profit from the opportunities offered by atomic energy until they had gone through a preliminary stage of industrialisation in the old way. If such a country had traditional power resources it would do better to try to make use of them as the difficulties it must overcome would be even greater with atomic energy. If it had no such resources that could be used economically it would do better, in most cases, to import fuel and use it in the traditional way rather than import small atomic installations which were expensive and would require foreign technicians to a much greater extent. This was true even where a country had deposits of natural uranium.

Nevertheless, these countries knew now that their eventual industrial expansion could never be halted by lack of cheap power. They should therefore prepare to use atomic energy, but not seek to make early industrial use of it, and by first training staff in a nuclear research centre they would gain the additional benefit of a strong stimulus to their general development in education.

Fusion and Fission

Professor Perrin did not think that the progress made towards the " taming " of the fusion reaction would make plant using the fission reactors obsolete before their depreciation value had been written off. It would take ten years to devise and construct apparatus in which the fusion reaction would yield a large amount of energy compared with that wasted in starting the reaction, and however remarkable the success of that apparatus might be it would still be a long way from any industrial plant in which the total cost of the energy produced would have been brought down to the level of other methods of power production at that time, including fission. Although in this total cost the cost of the new atomic fuel would be almost negligible this would also be so with uranium which by then would probably be utilised completely for breeding plutonium.

The main problem would be to reduce the cost of operation, maintenance and depreciation in an apparatus far more complicated than that of fission reactors. Since industrial utilisation of fusion energy would develop first with the direct liberation of the fission energy of uranium 238 or thorium through the action of fast neutrons, we would not be able to dispense with the precautions needed in disposing of radioactive waste with long life derived from the fission of heavy atoms. These precautions should receive particular attention at international level.

Conference Programme

On Monday afternoon the first of the ten general sessions was devoted to papers and discussions on the future of nuclear power and this was followed on the succeeding three days by general papers on experience with nuclear power plants, the possibility of controlled fusion, progress in the use of isotopes, operational experience in health and safety, the use of nuclear energy for purposes other than the generation of electricity, and plans for the construction of nuclear power plants. From Wednesday these have been paralleled by the five simultaneous technical sessions on physics; reactors; chemistry; isotopes and radiological protection; and raw materials and metallurgy.

By the time the conference ends on Saturday, 13th September, there will have been 77 separate sessions. In addition, six lectures are to be given by Dr. Homi Bhabha (India) on the role of nuclear energy in under-developed countries; by Academician J. E. Tamm (U.S.S.R.) on recent developments in fundamental physics; by Dr. Glenn Seaborg (U.S.A.) on recent developments in transplutonic elements; by Academician V. A. Engelhardt (U.S.S.R.) on the implications of atomic energy in biology; by Dr. Lloyd Berkner (U.S.A.) on international collaboration in science; and finally, Sir John Cockcroft (United Kingdom) will give a survey of the Conference in a lecture on the peaceful uses of atomic energy. The Conference proceedings are also being televised and relayed over a closed circuit to receivers in the commercial exhibition in the Palais des Expositions, a description of which appears in pp. 401-408 of this issue.

ment which can therefore be arranged for automatic operation without attendant staff. Because the equipment is small it can conveniently be housed in weather-proof and insect-proof cabinets, thus dispensing with the need for a station building. The B.B.C. utilises cabinets of existing design and special precautions have been taken to provide sufficient cooling. The power supply is included in the steel cabinets, so that the translator can work direct from the mains.

British Nuclear Plant for Italy

Last May, as we reported at the time, an agreement was signed by Sir Claude Gibb, on behalf of the Nuclear Power Plant Co., and an Italian organisation for the provision by the company of a nuclear power plant. At Geneva on 31st August the actual contract was signed. It covers the reactor, turbo-alternator and other principal equipment for a 200 MW station to be erected at Latina, about 40 miles from Rome. The supply of fuel during the life of the station is to be guaranteed by the United Kingdom Atomic Energy Authority. It is expected that the station will be in full commission by the middle of 1962.

Projected Beryllium Plant

What is said to be the first plant in Europe for producing beryllium in wrought form is to be built by Imperial Chemical Industries, Ltd., for operation by the end of next year. The metal plays an important part in nuclear reactor construction and the new plant will produce it in semi-fabricated form such as rod, tube and plate and in finished machined parts. Initially it will undertake a contract for the United Kingdom Atomic Energy Authority.

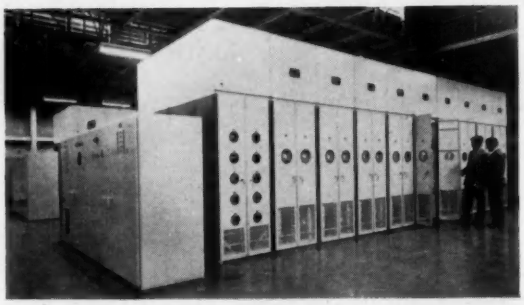
Nickel Alloy Exhibitions

A series of four-day exhibitions devoted to the practical uses of nickel and its alloys are to be held during September and October by Henry Wiggin & Co., Ltd. The first will be at the Royal Station Hotel, Newcastle-upon-Tyne, from 23rd to 26th September; the second at the Metropole, Leeds, from 14th to 17th October; and the final one from 28th to 31st October at the Grand Central Hotel, Belfast.

Running concurrently with each exhibition will be a series of lectures and film shows demonstrating the practical uses of alloys in high temperature work, and in chemical and electrical engineering, and others will feature welding techniques.

"Motor Transport" Cost Tables

The latest costs of running all capacities of goods vehicles, taking account of variations in drivers' and mechanics' wages, subsistence payments and the cost of petrol and diesel fuel, are given in "'Motor Transport' Cost Tables," published for *Motor Transport* by Iliffe & Sons, Ltd., Dorset House, Stamford Street, London, S.E.1, price 2s (postage 2d).



A.B.T.H. 12 MW rectifier bank consisting of 18 rectifiers with associated control cubicles which are installed at the Baie Comeau smelter plant of the Canadian British Aluminium Co. This large aluminium smelting plant was described in our issue of 17th January

The tables show the standing costs per year, per week and per hour, the running costs per mile, and the total charge per mile over a range of annual mileages for each size of vehicle, according to the part of the country in which it is based. Figures are included which enable the tables to be speedily adjusted by the user to allow for future fluctuations in fuel prices. As an aid to haulage contractors, the tables include an allowance for profit. Also included in the booklet is the *Motor Transport* fuel cost ready reckoner which gives the cost of fuel in pence per mile for all rates of consumption between 5 and 30 m.p.g. and for all prices of fuel from 3s 6d to 5s 3d in ¼d steps.

Prices of Materials

In the accompanying table we give the basis prices of the more important materials used in the electrical industry. The figures given are the selling prices and are those quoted on Tuesday last.

ALUMINIUM ingots	ton	£180 0s 0d
COPPER, H.C. Electro	ton	£203 5s 0d
Fire Refined 99·70%	ton	£202 0s 0d
Fire Refined 99·50%	ton	£201 0s 0d
COPPER Tubes	lb	1s 11½d
Sheet	ton	£229 10s 0d
H.C. wire and strip	ton	£252 5s 0d
LEAD, English	ton	£70 17s 6d
Foreign	ton	£69 0s 0d
MERCURY	flask	£79 0s 0d
TIN, block (English)	ton	£745 10s 0d
ZINC, G.O.B. Foreign	ton	£64 16s 3d
BRASS Tubes (solid drawn)	lb	1s 7½d
Wire	lb	2s 4½d
PHOSPHOR BRONZE Wire	lb	3s 8½d
PLATINUM	oz	£23 5s 0d
RUBBER, No. 1 R.S.S. spot	lb	23½d—23¾d

Educational

The regulations and syllabuses of the teacher's certificate in handicraft, the technical teacher's certificate and domestic subjects (further education) teacher's certificate for 1958-59 are now available from the City and Guilds of London Institute, Gresham College, Basinghall Street, London, E.C.2, price 2s (by post 2s 3d).

Industrial Course for Schoolgirls

Twelve senior schoolgirls from the Southend area recently attended a four-day course at the telecommunications and electronics centre at Coventry of the General Electric Co., Ltd. The course was arranged in conjunction with Mr. D. B. Bartlett, chief education officer for Southend, with the object of introducing the girls to the work of a major manufacturing organisation and giving them some idea of the kind of jobs undertaken by women. The four days were taken up by lectures, demonstrations of equipment, practical work, visits to various departments of the Coventry group and discussions on opportunities for women in the G.E.C.

Instrumentation for Atomic Energy

Sunvic Controls, Ltd., has developed its process control, electronics, data-handling and computer work to the point where complete, integrated control and safety systems for atomic energy projects are being undertaken, and it has now issued a brochure in English, French and German in which examples of its contribution to advanced nuclear instrumentation are described.

Switchgear for Railway Electrification Programmes

The British Transport Commission has placed an order with South Wales Switchgear, Ltd., for 266 sets of 6·25 kV switchgear equipment needed for the following electrification programmes in the Eastern Region of British Railways:—London (Fenchurch Street) to Tilbury and Southend; London (Liverpool Street) to Enfield, Chingford, Hertford East, and Bishop's Stortford; and London (Liverpool Street) to Chelmsford and Southend. The switchgear will be installed at feeder stations to control a.c. supplies to the overhead line equipment, and at intermediate track-sectioning cabins along the lines to be electrified.

Diesel-Electric Locomotives for East Africa

The English Electric Co., Ltd., has been awarded a contract for eight 1,840 h.p. diesel-electric locomotives for the East African Railways and Harbours. Each locomotive will be powered by an English Electric 12-cylinder charge cooled SVT diesel engine, will have a 1 Co-Co 1 wheel arrangement and a maximum service

speed of 45 m.p.h. The units will be capable of one-man operation and will weigh approximately 100 tons in working order, with a maximum axle load of 13·5 tons. The superstructure will be carried on two four-axle bogies, each bogie having three driving axles and one guiding axle, the latter being carried in a subsidiary truck. The bogies have been specially designed to reduce flange forces and flange wear will consequently be kept to the minimum. The locomotives, which are designed for metre gauge, will have a continuous tractive effort loading of 44,500 lb, and will be used on the main-line services between the Port of Mombasa, Nairobi and Kampala on the shores of Lake Victoria.

Disposal of Brussels Pavilion

The Federation of British Industries has entrusted George Cohen Sons & Co., Ltd., with the disposal of the British Industry Pavilion upon the conclusion of the Brussels Exhibition in October.

Exide in Rhodesia

A new factory for manufacturing automotive batteries was opened in Salisbury, Rhodesia, on 25th July, by Sir Roy Welensky, Prime Minister of the Federation of Rhodesia and Nyasaland. The factory has been built by the Chloride Electrical Storage (C.A.) (Pvt.) Co., Ltd. The plant covers an area of more than 20,000 sq ft and is equipped with the latest types of machinery and moulds, which have been designed by the Plant Development Department of the Chloride Electrical Storage Co., Ltd., at Clifton Junction, Manchester, for the particular conditions prevailing in Rhodesia.

The plant contains extensive servicing facilities, not only for users of "Exide" automotive batteries, but for all Chloride products, such as traction batteries used in the mines, stationary batteries in power stations, and batteries for the railways.

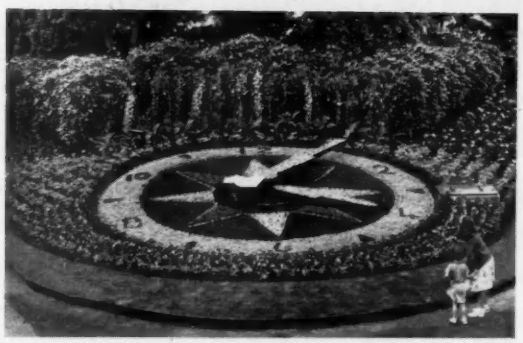
Electricity Board Film

A new 20-minute 16 mm coloured film dealing with the first ten years' work of the North Western Electricity Board has had its first showing. The film has been written, produced and "shot" by members of the Board staff and the commentator is Mr. R. Danvers - Walker. Entitled "The First Ten Years," the film has an introduction by Mr. T. E. Daniel, chairman of the Board. The film illustrates the organisation of electricity supply both before and after nationalisation and graphically underlines the problems faced by the Board both in its early and later years. The steady build-up of electricity demand during the ten years is noted, with its consequent extension of supply and commissioning of new substations. The camera takes the viewer into laboratories where electrical equipment of all kinds undergoes rigid test. Also shown is the Board's short-wave radio scheme set up during the ten years, which now covers the whole of its Area by means of radio-equipped vans controlled from 14 broadcasting stations. The provision of electricity to rural areas is stressed, and the film shows how the Board has tried to preserve the beauty of the surrounding countryside. The standardisation of hundreds of tariffs is underlined, and day-to-day working of the Board as it serves its consumers is given its place. There are also sections dealing with staff training and welfare matters.

An artist's impression of the new building which Philips Electrical, Ltd., is to erect in Bristol

Floral Clock

A floral clock has been given to the Borough of Willesden by S. Smith & Sons (England), Ltd., to mark the 25th anniversary of incorporation which falls on 7th September this year. The parks staff of the Corporation have planted 35,000 dwarf plants into the clock. A submerged central chamber contains the motion work and gearing, fitted with large rotary and thrust ball races to carry the hands. On the right-hand side of the dial, outside the 3 o'clock position, a submerged electric motor with reduction gear-box operates the clock through the medium of a suitably protected connecting rod. The dial is set at an angle of approximately 15 degrees and the clock is floodlit during the evenings. The presentation on behalf of Smiths was made by Mr. D. W. Barrett, C.B.E., managing director of Smiths Clocks & Watches, Ltd. The clock was made by English Clock Systems, a division of the Smiths group. Its diameter is 18ft and the hands alone carry 2,000 dwarf plants. The clock was officially handed over to the Borough by the Mayor, Alderman S. Scott, J.P.



The floral clock in Roundwood Park, Willesden

Philips South-West Region Headquarters

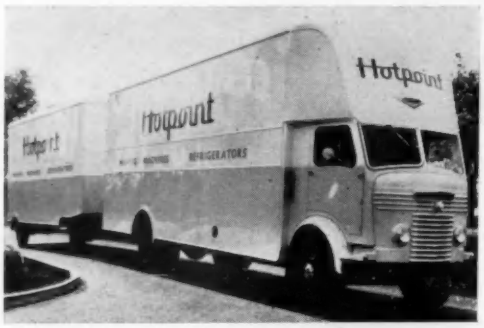
Philips Electrical, Ltd., is to erect a new building in Bristol to house the headquarters of its south-west region. The four-storey building will occupy an island site, covering 510 sq yd, bounded by Victoria Street, Long Row, St. Thomas Street and the new Spur Road. A total floor space of 16,000 sq ft will accommodate offices, a store, showroom, demonstration rooms, etc. It is expected that the new headquarters will be ready for occupation within twelve months from the date of commencement of building operations.

Instrument Training School

A training school to instruct customers' operators and maintenance staff in the use of pneumatic and electronic control instruments has been opened by Sunvic Controls, Ltd., at its Harlow, Essex, factory. The course will cover design, operation and applications of the pneumatic range of process control instruments, which are widely used in the oil and chemical industries. In addition to lectures, facilities are provided for practical instruction in a well-equipped laboratory. The school, which has for some time been providing instruction in use of multi-channel pulse height analysers will be now administratively merged with the new process control school, although courses will normally be separate.

New Hotpoint Vehicles

To facilitate the movement of refrigerator bodies between its Llandudno Junction and Peterborough factories, two 7-ton Commer chassis fitted with Luton type van bodies and towing trailer units have been put into service by the Hotpoint Electric



Vehicle combination for transporting Hotpoint refrigerator bodies

Appliance Co., Ltd. The vans and trailers, supplied by Rootes main dealers, Clarke Bros., Peterborough, are fitted with two detachable floors giving a loading area of 1,024 sq ft, enabling some 240 cabinets to be transported at a time. Both the van and trailer bodies were built by Cecil Saunders, Ltd., Letchworth, Herts.

Shareholders' Works Visit

More than 100 shareholders took advantage of the invitation of Permali, Ltd., to combine attendance at the annual general meeting with a tour of the new Gloucester works. During their visit they saw the result of concentrating all densified wood production, previously housed in five separate units, into one modern factory of 160,000 sq ft and were also shown the changes that had taken place in the existing Gloucester works for manufacturing new products.

Trade Literature Competition

The last day for submitting entries for the R.I.B.A. and Building Centre 1958 competition for manufacturers' trade and technical literature is 31st October. Inquiries should be addressed to the Building Centre, 26, Store Street, London, W.C.1 (telephone: Museum 5400).

The Food Fair

Electricity is not very prominent at the Food Fair being held at Olympia (28th August to 11th September) although the Gas Council has a quite elaborate display. But as the great majority of the exhibits seem to be packaged goods this is not of much significance. There are only three really "electrical" stands, the most prominent being that of the Kenwood Manufacturing Co., Ltd., upon which examples are displayed and demonstrated of the company's food preparation equipment, fan heaters, knife and scissors sharpener, the "Wastemaster" garbage disposal unit, the "Dishmaster" dish-washing machine (which the Kenwood company took over recently), the "Sun-Dry" spin dryer, and the "Rotisserie" spit roaster. Special attention is being drawn to a new bean-shredding and pea-podding attachment for the "Chef" mixer.

The first prize in a competition organised by J. Bibby & Sons, Ltd., is a cooker made by the Jackson Electric Stove Co., Ltd., who have supplied cookers to some other exhibitors; the second prize is a "Sunbeam" mixer.

The stand of Taylor Electrical Instruments, Ltd., is devoted to the demonstration of the company's rotary sausage griller. This has a set of rollers between which the sausages are rotated while being cooked by a 1,000 W heater with variable control.

Rotiss-o-Mat, Ltd., show their revolving spit cooker and warming cupboard in actual use.

High Marnham Power Station

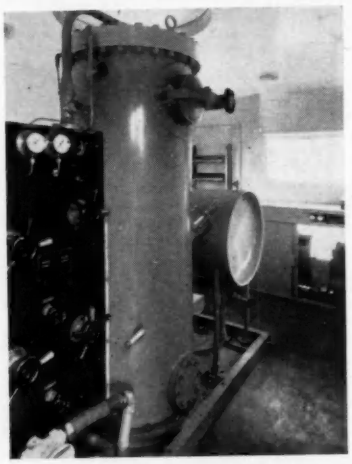
In the list of contractors for the High Marnham power station given in our issue of 29th August, Drake & Gorham, Ltd., were named as the suppliers of main and auxiliary cables; this should have read Drake & Gorham (Contractors), Ltd.

Price Reduction

The British Thomson-Houston Co., Ltd., has announced a 10 per cent price reduction on small variable-speed a.c. commutator motors (standard machines up to approximately 20 h.p.).

Mobile Oil Filter

A service employing a new mobile "Metafilter" unit for the cold filtration of insulating oils on site has been introduced by the Electrical Division of Wakefield-Dick Industrial Oils, Ltd., 46, Grosvenor Street, London, W.1. The unit operates at a circulation rate of more than 1,000 gallons per hour; this high operating speed has the added advantage of providing maximum disturbance of the oil, thereby ensuring the removal of oxidation products from the core and windings. The filter bed is composed of "Metasil" and filtration is extremely fine. In addition to solids and non-soluble sludges, colloidally dispersed carbon particles and fibres are also removed from the oil.



Interior view of the Wakefield-Dick oil filter unit vehicle

On the suction side of the filtration pump is fitted a water eliminator which effectively removes free water from the oil. The eliminator comprises a number of parallel sloping plates. During the passage of the oil, the plates collect any droplets of water present and drain them into a collecting tank. Furthermore the filtration medium itself will dry damp oil and will even remove a proportion of dissolved water. This ensures the complete elimination of free water, a negative crackle test and greatly improved electrical strength.

The filter unit carries its own source of power, but is also equipped with an electric drive for use where a 440 V three-phase supply is available. Sufficient hose is carried to enable filtration to be performed up to 120ft from the plant but longer hoses can be used where necessary. A special booster pump is used when the oil must be raised more than 26ft, or to cope with exceptional lengths of hose run.

Trade Announcements

New Day Electric (Sales), Ltd., a member of the Southern Areas Electric Corporation, Ltd., announces new selling arrangements effective from 1st September. Mr. C. H. E. Gillott is relinquishing his position as general sales manager in order to form his own company. His head office, the opening of which will be announced shortly, will be at 6-7, Russell Gardens, W.14 (telephone: Park 1234). The new company will act as agents throughout England and Wales, with the exception of Yorkshire and N.E. England, for all New Day Electric products apart from the "Merlin" washer.

Dimplex, Ltd., Millbrook, Southampton, is circulating to retailers and its agents overseas a wallet containing the "Dimplex News" and copies of new brochures relating to the company's heating appliances.

Alfred Herbert, Ltd., have been appointed sole selling agents in the United Kingdom and Eire for the planing machines and equipment manufactured by Planers (Huddersfield), Ltd.

The head office, works, and service department of **Key Electrical Installations** are now at Central Works, Hedge Lane, Palmers Green, London, N.13 (telephone: Pal. 3871 and 8945; night service: Lab. 4344 or Fin. 7826).

Mr. R. Y. Knight has been appointed a public address representative in the Midlands Region of **Philips Electrical, Ltd.**

British Association Meeting

The 120th annual meeting of the British Association for the Advancement of Science was held in Glasgow from 27th August to 3rd September under the presidency of Sir Alexander Fleck, whose address was summarised in last week's issue. Nuclear power, electronic computers, automatic control and instrumentation and the partnership between industry and education were among the subjects discussed during the meeting

IN his address as president of Section E (Engineering) at the British Association annual meeting in Glasgow, Professor O. A. Saunders, F.R.S. (London University), dealt with heat considered as a transient process of flow between systems of different temperatures. To the elementary bases of radiation, conduction and convection had now been added change of phase, as in evaporation and condensation, and chemical reaction. The advent of numerical methods, including relaxation techniques and digital and analogue computers, had enabled any problem of conduction to be solved even for unsteady states, however complicated the boundary conditions. For example, the complex thermal stress concentration in a turbine rotor due to its shape had been found with the aid of an electrical resistance analogue computer. Convection offered the greatest heat-transfer difficulties, but by similar means almost any boundary layer equations for free and forced laminar flow could be solved.

Reliance on experiment was still necessary in cases of turbulent flow (the commonest in modern industry) as exemplified in the need to reduce pressure loss in the carbon-dioxide flow in gas-cooled nuclear reactors (since the power output used to drive the circulating fans could reduce overall efficiency from 25 to 21 per cent) and this also influenced the design of fins for the uranium cans.

The reason for the much greater value of dropwise condensation of a vapour on a surface compared with a continuous film was still uncertain. Power station condensers could probably be halved in size if a dropwise condition could be relied upon.

Effusion cooling by forcing gas or liquid through porous walls, such as sintered metals, enabled a cheaper material or, for gas turbines, a higher gas temperature to be employed, but the mechanical strength of these was inferior to that of metallic alloys; the method might be applied later to the cooling of local hot spots.

By far the biggest recent advance in turbo-alternator design had come from improved heat transfer. Reduction in weight per kW, especially with direct conductor cooling and the use of hydrogen up to 30 lb/sq in, had opened up a new range of unit sizes from 200 to 350 MW.

The high thermal conductivity of liquid metals made them suitable for very high heat-transfer rates as in a fast reactor. Sodium and sodium-potassium eutectic alloy particularly did not capture neutrons wastefully. There was still uncertainty in interpreting their heat-transfer coefficients, possibly connected with the effects of thermal conduction in the direction of flow, which was negligible with non-metallic liquids. Another use of liquid metals might be for steam reheating in power stations to enable heat exchangers to be placed close to the turbines. Liquid metals had relatively low specific heats, so their weight would be high for a given heat removal. The high temperature drops across the thin walls of the tubes carrying liquid metal coolant might also become a critical factor.

Universities and Technological Education

The vital need for guidance for those planning to work in the scientific and technological fields was stressed by Professor F. A. Vick (University of North Staffordshire). Colleges and universities would require to provide leaders who must help not only to provide a full education for these workers, but also to enable others not themselves scientists or technologists, to play a full part in a technological world. Arts graduates taught traditionally might gain a false impression of the nature, scope and limitations of modern science, as they were unable to comprehend fully the problems of the age arising from scientific and technological advances. At Keele every graduate was exposed to science in a mature way, and science students took two years of arts and social sciences. It was important to break down intellectual snobbery from either side. He had noted a remarkable swing towards science in many sixth forms and visualised a future bottleneck at university level. He urged urgent discussion at universities with a view to greater flexibility and freedom in the choice or change of subjects. From eight years of experience at Keele he concluded that courses in science could be devised for arts students on a basis of real intellectual discipline. Women students were as good as men; in the Foundation Year they included courses taken together by arts and science students, giving a common ground for discussion; full residence without segregation increased education immensely; more flexibility in entrance requirements and courses in spite of the obvious difficulties was desirable.

Nuclear Reactor Control

In a paper on " The Control of Nuclear Reactors " Mr. J. Walker (Sperry Gyroscope Co.) described the basic principles of nuclear reactor control in terms of reactivity and outlined some of the natural changes in reactivity which occurred when the chain reaction operated. In particular attention must be paid to the effect on reactivity of temperature changes, fission product poisoning and fuel depletion, the relative importance of which differed as between reactor types and applications. He then outlined the methods whereby the appropriate rates of control action could be established theoretically for a particular reactor, indicating the form of control most likely to be suitable for different reactor types. He covered very fully the peculiarities of a nuclear reactor as an instrumentation problem more particularly as these affected the range of measurement and the derivation of

the control signal proportional to reactivity. He pointed out the great importance of the proper location of instruments, particularly those dealing with neutron flux density. Reliability and simplicity in instrumentation were dual characteristics essential for a proper control and safety system.

Silicone Polymers

The expanding field of application of silicone polymers was outlined by Dr. G. G. Freeman (I.C.I.). The fundamental work by Professor F. S. Kipping at Nottingham, he said, had encouraged a wide range of silicone product development in the U.S.A., largely to meet the need for electrical insulating materials able to function at high temperatures without charring. He described the chemistry and manufacture of the polymers, and their properties and applications, which varied from polishes, water repellent finishes, anti-foams, and constructional finishes to their vitally important scope in the electrical industry. Class H insulating materials had been based on the silicone resins. Silicone elastomers were prepared from linear molecules of very high molecular weight and were outstanding in their electrical properties with almost indefinite retention of elasticity within the temperature range 80 to 250 deg C.

Nuclear Instrumentation Problems

Dr. Denis Taylor (Plessey Nucleonics, Ltd.) discussed special instrumentation problems connected with nuclear power stations, including those relating to the detection of burst fuel elements; the measurement of the neutron flux distributions throughout the reactor core and the " in-pile " neutron detector.

In most existing types of reactor, he stated, the uranium fuel elements were sealed in gas-tight containers to prevent the escape of fission products into the coolant circuit. A fault in a container had to be located to its particular channel which could then be discharged before the coolant circuit became seriously contaminated.

The most generally adopted detector for gas-cooled reactors was the type used at Calder Hall; it depended on the detection of gaseous fission products which decayed into active solids. Some of these products decayed by beta-emission into positively charged particles, which could be attracted to a negatively charged electrode and were detected by a scintillation counter. A sample was attached to the top of each channel and brought out through the pressure vessel and the biological shield in groups of four and passed to rotary selector valves and thence to precipitation chamber/detection apparatus, the gas being then passed to the main coolant circuit by means of an auxiliary compressor. Bulk monitoring was also necessary to give immediate warning of a serious fault.

This gaseous fission-product detection system had proved very satisfactory at Calder Hall and was being installed at Calder " B," Chapelcross " A " and " B " and the French station at Marcoule and, for the first stage, C.E.G.B. power stations, but efforts were being made to simplify the system.

This method of detection had also been applied to water-cooled systems by scrubbing with helium the fission product gases (krypton and xenon), which had a low solubility in water.

The neutron-flux distribution across the core of the reactor must be periodically measured to ensure that the fuel element loading had been adjusted properly. At Calder Hall a wire was introduced into the reactor core and irradiated for a few moments. The induced activity proportional to the original neutron flux for each channel was then measured externally at each point on the wire within an ionisation chamber. The method had proved satisfactory, but was time consuming, and a more direct method is under development.

However, for reactor control (control of operating power level) the ionisation chamber must be in or near the core the whole time the reactor was operating. To avoid boron depletion the neutron-sensitive ionisation chamber was usually placed in a thermal column outside the reactor core, but the neutron flux in the thermal column must be constant. For higher power reactors some " in-pile " measurement for control must therefore be provided. There seemed no ideal answer to this problem, though probably the ionisation chamber used for flux distribution measurement, could be made gamma-sensitive, thus allowing " in-pile " detectors to provide control at powers near the normal operating levels. Neutron-sensitive chambers in the thermal column would have to be employed for the start-up of the reactor and control of the power at low levels.

Heat Transfer and Pressure Loss

An extensive investigation, being carried out at the Babcock & Wilcox Research Laboratories to determine the heat transfer and pressure loss characteristics of both plain and finned tube banks, was dealt with by Messrs. J. M. Miller and F. J. Reising. The three experimental rigs used operated at atmospheric pressure. The test bank was composed of a large number of tubes, normally ten rows deep, with a large gas-flow area relative to their dimensions. The heat flow was in the same direction as in a full-size boiler or economiser, i.e. from the gas to the tube to avoid possible controversy as to the interpretation of experimental data. In two heat transfer rigs hot combustion gases were produced by burning distillate oil with a large excess of air and avoiding any possibility of soot or tarry deposits on the tubes. Gas and water mass flows, temperature gain of water and temperature drop of gas were measured from which the gas side heat transfer coefficient was calculated. The pressure drop was measured by averaging " total head " tubes inserted in the gas stream and corrected for the difference in velocity heads between the inlet to and exit from the test bank.

The results from these rigs were directly applicable to the design of heat exchangers using clean gas as, for example, in atomic fuel steam-raising units. For fossil-fuel-fired heat exchangers the results must be corrected for deposits, which reduced the heat transfer rate and changed the pressure loss characteristics of the tube arrangements. With a third rig the effect of dusty deposits on heat transfer and pressure drop was investigated. The general design and test technique were similar to the other rigs, but provisions were made to inject fuel dust from precipitators of a typical pulverised-fuel-fired boiler into the hot gas stream. At low gas speeds the dust deposit reduced the heat transfer by as much as 50 per cent. At gas speeds above 50ft/sec the tubes remained very much cleaner and the fall in the heat transfer rate was very much less. It was inferred that self-cleaning of tubes takes place at high gas speeds.

Reactor Studies

Transfer function analysers would become a valuable tool for exploring complex reactor systems said Mr. J. R. MacLusky (Electronics Division, A.E.R.E.). The analogue computer could be regarded as a " working model " of the behaviour in the system being studied, whereas the t.f.a. was used after a project had been com-

pleted to gain further information regarding its kinetic behaviour, and could clearly be used to check on the actual reactor system the previous analogue computer results. To date equipments with twenty to eighty amplifiers had been employed for reactor studies, but one equipment with 1,500 amplifiers was now being planned.

Digital Computers

The use of electronic computers, covered by Dr. A. D. Booth (London University), outlined the development of electronic digital computers over the past ten years. The problem of storage remained to-day; the ratio between the power required to insert data into the store and the power recovered when data was read out, was about 10^6: 1. The amplification required to make good this attenuation and its attendant liability to pick up spurious signals made the storage problem intractable.

In the last two or three years commerce and industry had taken an increasingly active interest in the potential uses of the computer. In science it was revolutionising many branches of research. Crystal structures whose calculations once took three years to complete could now be analysed in as many weeks. In fluid dynamics, the design of power reactors, and economic planning, many similar conditions now apply. He regretted the lack of support in computer development by the large financial interests of this country.

Dr. Booth looked towards the limiting speed of a future computer using techniques as yet undiscovered and regarded these as determined from the number of logical elements in the computing unit and the velocity of light (3×10^{10} cm/sec).

Industry and Education

The present highly unsatisfactory state of craft training in the bulk of British industry had already been demonstrated in a book by Lady Gertrude Williams entitled "Recruitment to Skilled Trades," Sir Willis Jackson, F.R.S., said, giving his presidential address to Section L. on "The Partnership between Industry and Education." This analysis raised all sorts of questions, to which satisfactory answers and their implementation on a national scale were urgent and would need considerable changes in attitude among both employers and trade unions. It would also involve an extensive building programme and the solution of a difficult staffing problem. He offered no individual opinion since he doubted whether any such opinion would make much impact in the continued absence of a national body with executive powers and financial means to exercise powers effectively. A sub-committee of the N.J.A.C., under the chairmanship of Mr. Robert Carr, went no further than envisaging a purely advisory National Apprenticeship Council. A report proposed by a conference in Manchester in 1944 visualised a National Engineering Apprentice Council as a central directing body, and defined the responsibilities of regional councils proposed in terms of organisation and administration of training schemes in their area. That scheme proposed a very comprehensive policy financed by a national fund, provided jointly by the State, local education authorities, employers and trade unions. The difficulties in such a scheme would be great, but the issues were of great urgency and the difficulties must be faced and solved. The more effectively industry fulfilled its dual responsibility as a partner in more effective craft training, the fuller the benefits which would accrue to employer and employee alike and to the nation as a whole. Dealing with the schools, he thought it would be a serious matter if grammar schools were to regard technical subjects as a field for senior pupils of no great ability. Unless capable of undertaking advanced work in physics and mathematics, such pupils should preferably leave and enter industry at an earlier age and pursue their studies within the technical colleges.

Regarding technical colleges he commended the report of the Special Committee of the Ministry of Education in May, 1957. In this context more industrial concerns must ensure that full-time college staff members maintained post contact with industry, either by co-operation in research as consultants, or by periodic seconding. He also commended the proposal for the creation of a staff college where senior members of college staffs and industrial and commercial representatives could link for periods with a view to improved liaison.

P-n Junctions and Transistors

The properties and preparation of p-n junctions was covered by Dr. E. G. James (G.E.C.). The new industry had now reached the stage where devices could be designed with predetermined properties to give a high yield of production, mostly based on the use of p-n junctions using germanium or silicon. P-type germanium (or silicon) could be made by introducing a minute quantity (1 part in 10,000,000 was typical) of indium, gallium, boron or aluminium into the germanium crystal; n-type material was formed by doping the crystal with similar amounts of arsenic, antimony or phosphorus. He outlined three methods of achieving this fusion, and pointed out that already there were indications that each of these techniques had advantages and disadvantages in the fabrication of the devices. Hence the policy of using combinations of the three techniques, each exploited for its own advantages; this was particularly the case in transistors. The p-n junction was undoubtedly one of the most important conceptions of this age and it had already played a key role in the development of semi-conductor devices. Junction diodes and junction transistors were the most important examples to date. More complicated structures of more than two junctions were now being evolved, with promise of interesting properties.

Speaking on "P-n Junctions and Transistors" Mr. G. King (Standard Telephones & Cables) pointed to the much more intricate operations now feasible and economic through transistor use. The business of electronic engineers might be said to be the processing of "bits" of information. For example the sequence from microphone or camera through a radio station to a receiver to a loudspeaker or picture tube was simply a chain over which information was passed from one place to another.

A telephone exchange might be regarded in the same way. A computer also, with the added complication that the bits were processed by addition in various ways in the chain. In the past all this had had to be done with a large expenditure of electric power which was mostly wasted as heat.

The transistor now offered a handling tool which needed power of only say, ten times a suitable sized bit, instead of say, one thousand times. Its small size, added to saving in wasted heat, made much better packing possible, so that very large and complex systems need not now take up too much space or heat themselves up too much for safety and long life of the components. In principle also it had nothing to wear out, so that such complex systems would not be out of action due to failures and the time required to locate failures. A transistor consisted of two diodes built back to back on the two

sides of a very thin slice of semi-conductor. One of these, the emitter, injected current carriers through the intervening material to the other, the collector. This collector diode was biased in the reverse direction, so that its circuit was a higher impedance one than the emitter circuit. If the design allowed most of the carriers, i.e. electrical current, to travel from the low impedance emitter circuit into the high impedance collector circuit, then there was a gain in power and hence the device amplified.

The semi-conductor physicist automatically thought on a molecular scale and with reference to motions of free charge carriers in a crystal lattice. The semi-conductor engineer thought of assembling pieces with very accurate small dimensions some like slivers of glass thinner than paper, some like minute spheres of butter, all accurately controlled.

Thermonuclear Research

Some aspects of thermonuclear research were considered by Dr. T. E. Allibone, F.R.S. (A.E.I. Research Laboratory, Aldermaston), who said that efforts in Britain had been concentrated on the method of approach involving the pinch effect—the original concept of Sir George Thomson—in which the electromagnetic forces associated with a high-current discharge pulled the hot gas (deuterium ions) away from the walls of a containing toroidal vessel (to prevent its destruction) and compressed it into a narrow cylindrical channel.

Particulars were given of the various stages of the research carried out in close collaboration between the A.E.R.E. at Harwell and the A.E.I. at Aldermaston, which led up to construction of the ZETA and SCEPTRE apparatus, respectively. The two main problems were found to be connected with discharge instability and vaporisation of the tube walls. Discharges were stable for 2 millisec for ZETA and 0·5 millisec for SCEPTRE, the sizes of the toroidal tubes differing considerably. Currents studied ranged from 5×10^4 to 2×10^5 A, and neutrons were first observed throughout most of the current pulse of the higher currents in August, 1957, in ZETA and shortly afterwards in SCEPTRE. The marked difference in these neutrons compared with those found in the earlier linear discharge gave good reason for confidence that their origin was thermonuclear. Further measurements of the neutron energies, however, showed the ion temperatures to be below one million degrees and the reactions to be caused by a few of the deuterons being accelerated parallel to the discharge current to energies of 17 keV. The evidence for a stable discharge maintained for a long period still stands. Questions now to be answered concerned the true ion and electron temperatures and how the heat generated in gas was lost to the walls. The next advance might come through improved material for the tube walls and the removal of the major heat loss by avoidance of arc breakdowns at gaps in the metal torus.

Nuclear Developments

Nuclear power and the engineer was the subject of a discourse by Sir Christopher Hinton (chairman, C.E.G.B.), who after explaining the difference in heat production from conventional fuels by chemical means (in which only the movement of electrons is affected) and from nuclear fission, discussed the scientific principles behind the latter and the engineering methods adopted for making use of it.

Reactors now being built to provide power for industrial purposes, while being identical in principle with those evolved for Calder Hall, incorporated further means of improving efficiency. Foremost among these (as with conventional power stations) had been the achievement of higher temperatures in the cooling gas leaving the reactor. Another major factor was the higher rating of the fuel elements, which would greatly reduce the size and halve the capital cost of a reactor.

Further developments in metallurgical research and development were essential to enable present designs of nuclear power stations (for producing electricity at 0·66 to 0·70d/kWh) to compete in overall costs with the most modern conventional plants (0·54d/kWh). With nuclear generation two-thirds of the cost per kWh was due to capital charges and only one-third to fuel and operation, whereas for conventional plants the proportions were reversed.

At the present rate of expansion of nuclear plant (5,000 to 6,000 MW by 1966 proposed), it would have to carry a share of the peak load by 1971, which would economically necessitate very much lower capital costs than at present.

Problems of the next ten years were likely to be as great as for the first ten years. As an example, no great improvement in top temperatures could be expected while continuing to use magnesium alloy as canning material. Alternatives would be stainless steel (an uneconomical absorber of neutrons) or some material, such as beryllium, having a low neutron cross-section and a high melting point, but expensive and dangerous to handle.

To minimise the quantity used would mean higher ratings to obtain the maximum amount of heat from every fuel element, giving rise to fuel-element centre temperatures too high for uranium. Either a costly ceramic or a cermet fuel element would be necessary.

Nuclear Scientists' Sub-Committee

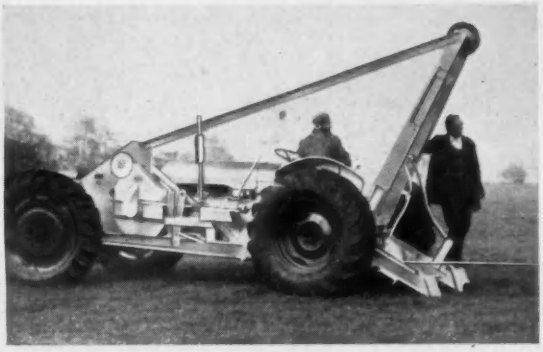
The formation of an atomic scientists' sub-committee of the British Association was announced by Sir Alexander Fleck, addressing the Glasgow Rotary Club. Its function would be the spreading of adequate and properly authenticated news and views on the subject of nuclear science. The Association was seeking to extend its activities particularly among younger people and was seeking to treble its income of £11,000 a year to that end. In this they had already received sound support from industry.

NUCLEAR FUSION KNOWLEDGE FREED

IN Geneva last Saturday, on the eve of the opening of the second "Atoms for Peace" Conference, Mr. Lewis Strauss (United States Atomic Energy Commission) and Sir John Cockcroft (United Kingdom Atomic Energy Authority) announced that their two countries had decided to "de-classify" information which they had gained in their researches into the control of nuclear fusion for the production of power for "peaceful" uses.

A statement issued by the U.K.A.E.A. announced that when the necessary administrative arrangements were completed this declassification would make it possible for scientists from other countries to pursue studies at some of the centres at which research on controlled thermo-nuclear energy was being carried out. There had been a complete exchange of information on the subject between the United States and the United Kingdom since 1956. Considerable progress had been made, but the attainment of useful power from controlled fusion reactions might still require many years of sustained effort.

Among the Russian exhibits at Geneva is a model of what is claimed to be the largest thermo-nuclear fusion apparatus so far built.



Left: Fig. 1.—The basic equipment is a powered multi-drum winch with pilot (drawing) cords. Right: Fig. 2.—Tensioning is effected by a rubber-tyred tractor winch

Overhead Line Erection

REDUCTION OF DAMAGE TO LAND AND CROPS

DAMAGE to land, crops, hedges and pasture is, unfortunately, not completely avoidable in transmission line construction, however much care is taken, but developments by Balfour, Beatty & Co., Ltd., in method and machines have made possible very considerable reductions in such damage.

The basic equipment is a powered multi-drum winch containing as many light pilot cords as conductors in the circuit, each on a separate drum and each the same length as the conductor being run out. The procedure is to run out the cords from the multi-drum winch by hand, threading them through running-out blocks on consecutive towers and finally attaching the ends to the running ends of the conductors. The winch motor is then started up and all conductors are pulled out together from end to end of the drum length without pausing or flaking at tower positions. Fig. 1 shows the winch turned round after winching lengths of conductor through woodland. It will be seen that the telephone is manned and the pilots are under tension, pulling the adjacent conductor lengths.

The operation is under complete control by field telephones installed at the winch and at the conductor drums, and by a portable instrument plugged in as required by the linesmen who guide the conductors on to trestles and scaffolds.

A light type of extensible and folding trestle is a supplementary development made possible by the use of ball-bearing rollers which practically eliminate the frictional drag that normally causes buckling and overturning. This is used extensively to keep conductors clear of shrubs, crops, glasshouses, orchards, fences, etc. A specially developed winch (Fig. 2) is used for tensioning the heavier conductors and, being mounted on giant rubber tyres, is fully mobile and causes less damage, both whilst in transit and operation, than the tracked vehicles in common use.

It will be appreciated that the fitting of ropes of ample length permits considerable freedom in the selection of operating positions for both the heavy strain tractor and the multi-drum winch, and this again contributes to the reduction of constructional damage. This method has been employed by the company for stringing many of the 275 and 132 kV lines which have been erected by them in this country, and also on 132 kV lines abroad, and has substantially reduced surface damage.

The limitation of damage in the placing of foundations and the erection of towers has, of course, also been studied and has been achieved principally by the careful selection of suitable transport and by the strict adherence to authorised routes.

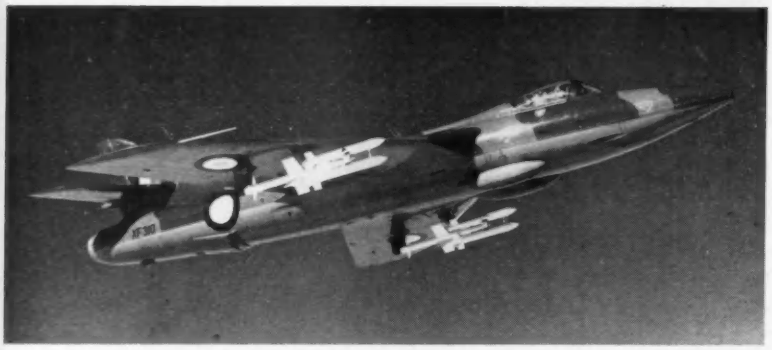
Australian News

IN less than two years the television industry has firmly established itself in Australia. Production and demand are at high levels and, although the industry is keenly competitive, most manufacturers are confident of maintaining production at satisfactory levels. It is possible that this year's demand will exceed 250,000 sets and by 1959 could be running at the rate of 300,000 sets a year, but even at this level it would still be within the existing capacity of the industry.

In the refrigerator industry it is believed that the level of demand will not show any appreciable change in the immediate future. Output has declined substantially since the peak production of 280,000 in 1954-55, and some producers believe that this year's demand will stabilise somewhere between 180,000 and 200,000, with keen competition continuing.

New South Wales has a better electricity supply system and cheaper overall power prices than any other State in Australia, the secretary of the Local Government Association, Mr. A. Mainerd, claimed recently. He said that the supply industry, under local government control, had been better developed in N.S.W. than in other States with central control of power generation and distribution. Local government authorities would strongly oppose the setting up of a single central authority to control the generation and supply of electricity in the State, he said. Mr. Mainerd considered that a central authority would prove most detrimental to the economic and efficient operation of the industry.

The Australian Broadcasting Control Board has completed the hearing of an application for a TV licence in Western Australia. Reports on hearings in South Australia and Queensland are still uncompleted, and applicants for a Tasmanian licence are yet to be heard.



Hawker Hunter IV with "Fireflash" guided missile

Due to the difficulty of providing a constant speed prime mover, aircraft electrical systems have been operated from a d.c. source. With the recent introduction of a variable-ratio constant-speed gear-box and the advent of a brushless alternator, a trend towards a.c. generation at 200 V, 400 c/s is evident at the Farnborough exhibition

Aircraft Electrical Equipment

REVIEW OF S.B.A.C. EXHIBITION AT FARNBOROUGH

THE annual flying display and exhibition is being held this week (5th to 7th September) at the Royal Aircraft Establishment, Farnborough, Hants, by the Society of British Aircraft Constructors (S.B.A.C.). The "static" exhibition includes many items of electrical equipment for aircraft and guided missiles with a continuing trend towards compactness and low weight and the ability to operate at high temperatures.

Generating Systems

Three main systems are currently employed for electric power generation in aircraft: 28 V d.c., 112 V d.c. and 200 V a.c. at 400 c/s. A.c. generation has, perhaps, more advantages than d.c. generation, but until fairly recently, aircraft electrical systems have been supplied from a d.c. source, due mainly to the difficulty of providing a constant-speed prime mover. A limiting factor in the output of a d.c. generator is commutation. Alternators can give a greater output on a frame size basis than d.c. generators which is particularly advantageous in an aircraft, where unnecessary weight must be avoided. The increasing demand for electrical power in modern aircraft, now approaching 100 kW, is another item in favour of a.c. generation. Most equipment in an aircraft can be operated by, and many in fact require, an a.c. supply. The few odd d.c. components can easily be supplied through a rectifier. Three-phase induction motors, a.c. switches and transformers are much simpler than their d.c. counterparts and partial functioning can still be maintained if one phase fails.

One method of a.c. generation starts with frequency-wild alternators feeding d.c. motors, via rectifiers, which drive the constant-speed alternators. Another method of obtaining a constant frequency supply is by driving the alternators by the main aircraft engines via a variable-ratio hydraulic gearbox. A unit of this type, the Sundstrand, was described in the *Electrical Review* of 25th February, 1955. An advantage of d.c. generation, which also applies to the constant frequency a.c. system, is that the generators driven by each aero engine can be easily paralleled. Whether a.c. or d.c. generation is employed there are many complications attendant upon airborne equipment and there is still considerable controversy as to whether the generation should be a.c. or d.c. No standardised system has yet been devised. However, a definite trend towards the use of the 400 c/s a.c. system is evident at the Farnborough Exhibition.

At high altitudes, serious brushwear problems exist and this has led to the development of a brushless alternator. English Electric are showing a variable-ratio constant-speed drive with a brushless alternator attached to the output shaft. The alternator is an air-cooled machine, incorporating rotating silicon rectifiers and has been specifically designed for civil aircraft. Equipment used in this constant frequency system, also being shown by English Electric, includes alternator panels which provide control and protection facilities and frequency and load controllers which monitor the basic governor setting and equalise the load distribution between alternators operating in parallel.

Rotax, Ltd., are also showing a rotating rectifier brushless alternator. This oil-cooled machine is continuously rated at 40 kVA at 0·75 to unity power factor, three-phase star connected, 208/120 V, 400 c/s with a weight of 87 lb. It is rated for a nominal speed of 8,000 r.p.m. obtained from some form of constant-speed drive. The output of a built-in exciter provides d.c. excitation to the main alternator field through rectifiers which rotate with the shaft. A.c. and d.c. generators for main services are also being shown by Newton Brothers. Small high-frequency single-phase alternators, designed primarily for missile purposes, are displayed by De Havilland Propellers, Ltd.

The equipment showing the contribution to a.c. techniques in aircraft engineering on the Plessey Company's stand includes a transformer-rectifier unit, an a.c. actuator motor, a selection of a.c. actuators, circuit-breakers, relays, a ram air turbine driven emergency electrical power supply unit, and a 3 kVA invertor.

Some typical examples of aircraft electric motors are being shown by the British Thomson-Houston Company. These exhibits include very small induction motors as used in radar servo-control circuits and small blower units. A small two-way induction motor, shown by S. G. Brown, Ltd., measures about 1½in by 1½in diameter. The copper sleeve rotors of this motor are contained in

a flange fitting duralumin case and the stator shell of aluminium tube accommodates the laminations.

The latest design from Smith's Aircraft Instruments, Ltd., is the size 07 servo-motor. This two-phase squirrel-cage induction motor has an overall diameter of ⅜in. A variation of this design has a centre-tapped control winding which can be driven by a pair of transistors without the necessity of an output transformer. The range of 400 c/s motors made by Smith's includes hysteresis, drag-cup and squirrel-cage motors up to 2¼in diameter. The hysteresis motors are completely synchronous and self-starting under load and they are therefore useful when an exactly controlled speed is required. Drag-cup motors are highly sensitive and have been widely used for the position-control type of servo used in many instrument applications.

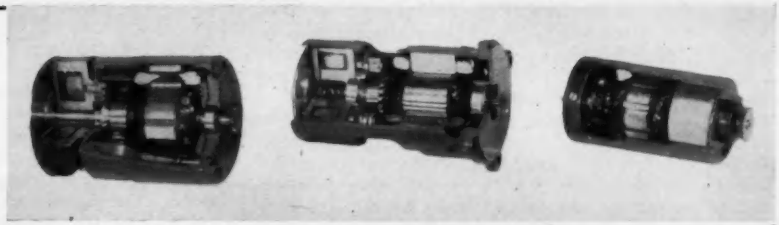
Among the units shown by Joseph Lucas, Ltd., are combined pump and hydraulic motors for driving 40 kVA alternators. A refinement in alternator or generator drive application is the introduction of an automatic speed control which will operate in the event of failure of either the alternator or the frequency control system. It utilises the centrifugal pressure from the motor body and applies it to a diaphragm operating a half-ball valve. The 400 c/s hydraulic power unit shown by Electro-Hydraulics comprises a ¾ h.p., 200 V, three-phase, 400 c/s motor, gear pump, two pressure switches, accumulator, electrically-operated valve, contactor and electrical connectors. Hydraulic power packs embodying an electric motor are also being shown by Integral, Ltd.

Ferranti, Ltd., are showing a transformer-rectifier unit with the minimum overall dimensions and weight. The silicon rectifiers are of high stability and are conservatively rated to give long life and reliability. The output arrangement is six-phase with balance coil, ensuring the best regulation and minimum transformer losses for minimum weight.

Batteries

A lightweight, ventilated and unspillable airborne battery is being exhibited for the first time by Joseph Lucas, Ltd., in three different sizes with different types of terminals. It has a 24 V, 24 Ah capacity and weighs 39 lb including the acid. Ultra Electric have developed various types of sea water battery. Designs, which are produced to individual customers' requirements, have capacities up to 1,000 Wh and are particularly applicable to survival kits in lifejackets and dinghies. Also shown for the first time at this exhibition are the Venner type HT 125 lightweight silver-zinc accumulators, particularly suitable for guided missiles. The batteries are hermetically sealed and no topping-up or maintenance is required.

1. *Small electric motors shown by Western Manufacturing (Reading), Ltd.*
2. *Rotax 40 kVA brushless alternator*
3. *English Electric constant-speed drive*



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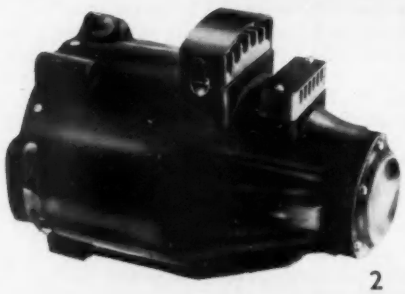

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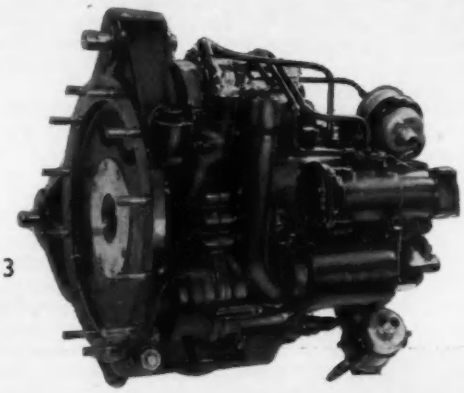

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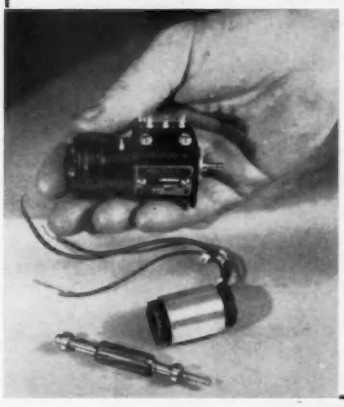

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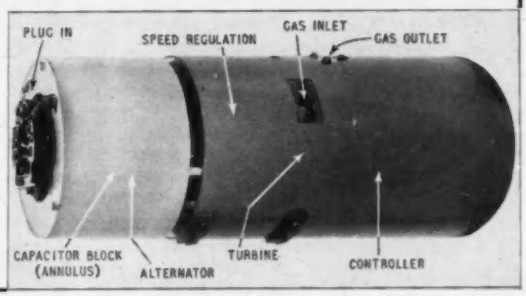
4. *Typical small B.T.H. aircraft a.c. motor showing stator and rotor separately*
5. *De Havilland 2 kW air-driven guided missile alternator, 15in long*



The HT 125 cell has a nominal capacity of 0·125 Ah and is suitable for discharge over a range of currents from 10 to 500 mA.

Claimed to be the first battery to be produced in this country with built-in ventilation, the 24 V, 25 Ah battery shown by Peto & Radford vents into a compartment on the top of the battery which is connected to a pipe leading through the outside skin of the aircraft. Because of differential pressure when the aircraft is flying, air from the cabin blows through this compartment and exhausts the gases outside the aircraft. The battery has a high capacity/weight ratio and is unspillable in any position. Several examples of batteries for use in guided missiles are being shown by Burndept, Ltd. The batteries being developed by this firm for this purpose cover a very wide range, varying in voltage output from 650 V down to 1·2 V.

A demonstration of solar-activated cells is being given on the Chloride Batteries, Ltd., stand. These cells are activated by the rays of the sun and are used to recharge small orthodox batteries. Thus the variable output of the solar cell, which is dependent upon the intensity of the sunlight, may be converted to a steady usable supply by the orthodox accumulator.

Cables

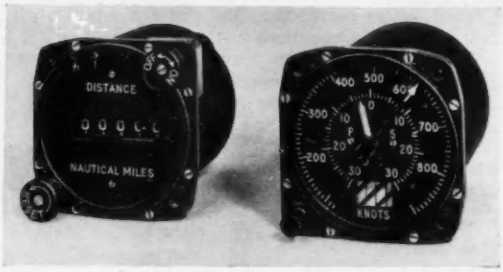
The main theme of the British Insulated Callender's Cables, Ltd., stand deals with specialised items applicable to the guided missile field. "Uni-efglas" cables are designed for continuous operation up to a maximum temperature of 240 deg C. With a p.t.f.e. and glass insulation, developed by B.I.C.C., it is resistant to all aircraft oils and fuels and abrasion and will remain flexible down to −75 deg C. "Tensil" and "Nyvin" cables, which are becoming increasingly popular for aircraft wiring, are being shown by W. T. Henley's. Miniature aircraft cables are also being shown by the Telegraph Construction & Maintenance Co., Ltd. I.C.I. are exhibiting "Fluon" plastic which is being used for electronic and control equipment in aircraft. A range of oil-resistant components made from "Butakon" rubbers is also being displayed by I.C.I.

A fuse shown by Belling & Lee, the "Airfuse," is suitable for 30 V with ratings from 35 to 500 A. This fuse requires no holder and thus saves weight. It is interchangeable with the standard American aircraft fuse.

Navigational Aids

Point-to-point navigation systems can be divided into those requiring ground facilities and those which do not rely on any ground equipment. The former methods depend on radio signals giving bearing or distance measurements. The only airborne equipment required in one system is a pilot-operated radio-telephone set. The bearings obtained from the v.h.f. transmission are observed by the ground operator and relayed to the pilot. By means of a loop aerial which can be turned to obtain a minimum signal, direction finding can be carried out from the air. When the loop aerial is servo operated the system is called automatic direction finding. E. K. Cole, Ltd., are showing an automatic direction finding equipment, the C.E. 178, which is claimed to be the lowest-priced a.d.f. equipment in Britain. Bearing indication without sense ambiguity is provided by a single radial line on a cathode-ray tube screen.

Another system employs the measurement of the time interval between transmitting a pulse from an aircraft and receiving a reply from a ground transmitter to give the distance from the ground transmitter. An example of this type of airborne navigational aid, the "Rebecca 8F" is being shown by Murphy Radio, Ltd. It provides a meter display of range and homing information in the pilot's position and a meter and cathode-ray tube display in the navigator's position. The equipment operates in the frequency range of 200 to 235 Mc/s and comprises a transmitter-receiver unit, time base unit and junction box mounted on a standard rack and installed in the equipment bay. The time base unit has its own rotary power unit and includes a 400 c/s oscillator to meet the requirements of the c.r.t. indicator unit.



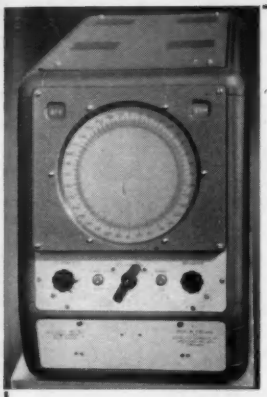
Display equipment of the Marconi AD2300 Doppler navigator

Hyperbolic navigation systems employ three or four ground stations transmitting synchronised signals. The difference in transmission times measured by the aircraft's receiver fixes the position of the aircraft somewhere along a hyperbola between a pair of transmitters. The intersection of two hyperbolas gives the aircraft's position. Another hyperbolic method, used by Decca, depends on phase differences.

The dead reckoning type of navigation system does not depend on any ground facilities. Distance moved from a datum is computed by integrating the ground speed. One system of measuring the ground speed is by a radar system using the Doppler effect. An example of this system, integrated with the Decca hyperbolic method already mentioned, is being shown by Decca Navigator Co., Ltd. This is the DIAN (the Decca Integrated Airborne Navigator). Another Doppler system is being shown by Marconi. The AD 2300 Doppler navigator employs a continuous wave, frequency-modulated system. It is effective at any altitude up to 50,000ft and the ground speed range lies between 80 and 900 knots. An automatic memory is incorporated which comes into action whenever the Doppler signal-to-noise ratio is below an acceptable level.

Inertial navigation is another system requiring no ground equipment. The first system of this type was successfully operated over eight years ago by Sperry, but it is extremely expensive and is not yet capable of providing accurate information over the length of time of flight of airliners. It is used, however, in guided missiles. Accelerometers are used to measure acceleration which is integrated to compute the ground speed.

Graseby Instruments are showing an accelerometer unit. The unit type GI 14 is a rugged and compact instrument designed to transform acceleration forces in three mutually perpendicular planes into three linear independently varying d.c. voltage signals. Each accelerometer consists of a spring-supported mass system which actuates the wipers of two independent precision potentiometers and varies the resistance ratios in direct proportion to the value of acceleration. The complete unit is sealed and filled with silicone fluid of a suitable viscosity to damp the instrument. The silicone fluid also acts as a lubricant and cleansing agent on the potentiometer element.



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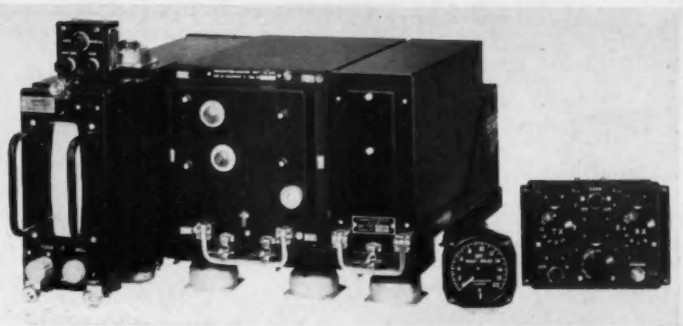

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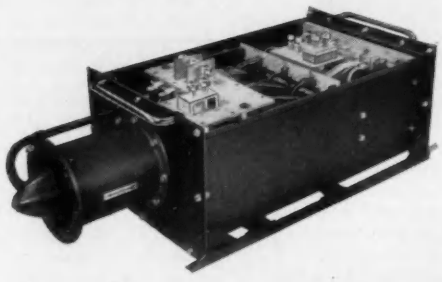
1. *Ekco v.h.f. automatic direction finder indicator unit*
2. *"Rebecca 8F" airborne navigational aid shown by Murphy Radio*
3. *Ferranti transformer rectifier unit*
4. *Venner type HT 125 silver-zinc accumulators*



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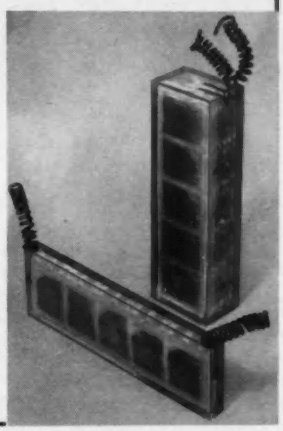

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Both Doppler and inertial navigation systems require computers to calculate the position of the aircraft at any moment. The computers are designed to convert the observed data into a form which is suitable for use by the pilot or auto-pilot.

An air data computer, shown by Kelvin & Hughes, is an electrical mechanical analogue computer, which measures the basic quantities of pitot and static pressure and from these computes altitude, rate of climb, mach number and indicated air speed. The pressures are measured by force balance systems, which apply an equal and opposite force from a high-precision spring to the output of the pressure capsule. To compute the mach number, the force balance system outputs are fed to a servo-driven Wheatstone bridge.

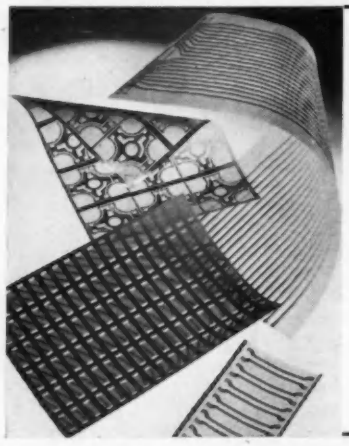
One type of landing system, the Ground Control Approach (G.C.A.), fixes the aircraft's position by means of two precision radar sets. The ground controller passes instructions to the pilot over the radio telephone. Airborne equipments rely on a beam from the ground along which the pilot tries to fly. The Instrument Landing System (I.L.S.) provides a localiser beam to give azimuth guidance and a glide path. A new I.L.S. with incorporated direction finding is being shown for the first time by Standard Telephones & Cables, Ltd. This equipment, which uses transistors, has been ordered by B.E.A. for their Vanguard and Comet fleets. The Pye I.L.S. enables a pilot to bring his aircraft in from 30 miles to within 150ft of the runway. Glide path receivers are included among the comprehensive range of equipment shown on Elliott Brothers' stand.

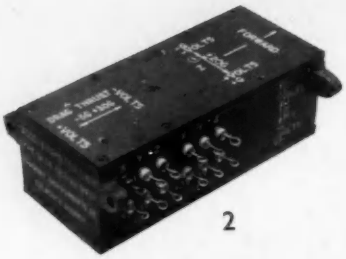
To reduce the number of dials in front of the pilot, particularly during approach, the gyro-magnetic compass, artificial horizon and the I.L.S. cross-point meter are now combined in a flight director which takes the information from the three instruments and converts them to flying instructions. The Sperry Zero Reader is a gyroscopic flight and navigational instrument for the manual control of the aircraft. It extracts altitude, azimuth and radio information and presents it to the pilot on a simple two-pointer indicator. Smiths Aircraft Instruments, Ltd., are showing their Flight System which is designed for large transport aircraft.

One of the principal purposes of air traffic control is to prevent collisions and much development work has yet to be carried out on suitable control systems. The emphasis of the Decca Radar exhibits is on the application of radar to civil aviation. Their new D.A.S.R. 1 long-range civil surveillance radar, which was recently introduced, is especially suitable for terminal use where high-speed, high-altitude, civil aircraft are being operated. This equipment, which operates in the 10 cm band, provides long- and close-range coverage. The principal exhibit of Cossor Radar & Electronics, Ltd., is a range of air traffic control radar units. On view is a medium-range primary surveillance radar, a secondary surveillance radar system and a new display system.

Instruments

Sangamo Weston, Ltd., are featuring their new jet pipe temperature indicators of the circular scale pattern. Two sizes of the instrument are designed for direct connection with the Chromel/Alumel type of thermo-couple. They are suitable for use with 8 ohm or 25 ohm systems and are provided with automatic cold junction





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1. *Ferranti printed circuits*
2. *Graseby Instruments accelerometer*
3. *Sangamo Weston jet pipe temperature indicator*

compensation. A motorised gyro horizon is being shown by Redifon, Ltd.

An instrument test set is being exhibited by Bryans Aeroquipment, Ltd. It has been designed to carry out *in situ* leak testing and functional checking tests of direct and remote instruments which are connected to pitot/static systems. A 4 V d.c. buzzer is used for vibrating the test set instrument panel during tests.

Wayne Kerr are demonstrating their new vibration meter to examine resonance in a scale model wing. The probe of this meter is excited by an ultrasonic current which is modulated by the object under investigation in proportion to its vibration amplitude. Thermionic Products are showing a Mark XII recording equipment which is designed to run for 16 hours without attention.

Selenium rectifiers for aircraft power supplies are being shown by the Westinghouse Brake & Signal Co., Ltd. Goodmans Industries, Ltd., are demonstrating their latest development, a sweeping oscillator in a prototype form. This is a sine wave oscillator with fully automatic motor driven frequency sweep. Examples of printed circuits are being shown by Ferranti, Ltd., and Bakelite, Ltd.

Some of the most advanced telemetry equipment, as used in rockets and guided missiles, is being shown by E.M.I. Electronics, Ltd. The telemetry receiving system exhibited by McMichael Radio receives data signals from guided missiles and records them photographically on ciné film.

The Solartron " Minispace," which is being shown for the first time, is a small analogue computer designed to meet the needs of research and development laboratories and educational establishments. The " Minispace " is completely self-contained and comprises ten drift-corrected d.c. amplifiers with all the necessary input and feedback components, potentiometers, control and patching panels and power supplies. The whole is contained in a cabinet 51in high, 20in wide and 30in deep. Each of the ten amplifiers may be used for summing, sign reversing, integration or the simulation of a transfer function over a wide range. Thus any problem requiring up to ten such operations may be solved or simulated, such as two simultaneous second or third order differential equations; one equation of the fourth or fifth order; or network analysis.

The development of welding and cutting in the aircraft industry is illustrated in the exhibits of British Oxygen Gases, Ltd. Automatic " Argonarc " welding is shown and the applications of this process include the fabrication of jet tubes for Armstrong-Siddeley " Sapphire " engines. Prominence is given on the Sciaky Welding stand to the operation of the power circuit of frequency conversion three-phase balanced load resistance welding equipment. A typical control cabinet for a Sciaky three-phase light alloy welding machine for aircraft production is being shown. Dekatron control circuits are used on this panel.

A switch designed for automatic timed sequence of operation for gas turbine cartridge starting systems is shown by Teddington Aircraft Controls, Ltd. Murex Welding Processes, Ltd., are showing mobile ground power units which are designed to supply power for servicing and starting all types of aircraft. The unit can supply a current of 600 A at 28 V continuously and a peak current of 2,000 A can be obtained for engine starting.

Dawe Instruments, Ltd., are making a special feature this year of their complete range of " Soniclean " generators, tank transducers and immersible transducer assemblies. These cater for a wide selection of components that require a scrupulously clean finish. The " Soniclean " range of equipments operate at a frequency of approximately 40 kc/s pulsed at 50 c/s, the optimum frequency range for efficient ultrasonic cleaning, and power outputs range from 250 W to 4 kW.

A comprehensive range of passenger facility panels, electroluminescent warning signs, roof cabin lights, etc., are being shown by Thorn Electrical Industries, Ltd. A 28 V d.c. transistor-operated system which enables fluorescent tubes to be used for aircraft cabin lighting has been developed by the General Electric Co., Ltd., in conjunction with Vickers-Armstrongs (Aircraft), Ltd. The unit shown is designed to operate 4ft or 3ft tubes at a low brightness suitable to the mounting position near the passengers' heads. Also on view is a unit designed for 115 V, 400 c/s which operates the 4ft tube at the same brightness as the transistor system. Airfield lights are being exhibited by Harley Aircraft Landing Lamps.

F. G. Miles, Ltd., are featuring an electronic simulator representing a typical gas turbine engine. A signal light indicator, the " Magna-Gage," for checking repetition parts within plus or minus tolerances is being shown by Southern Instruments, Ltd. It consists of two parts, a probe and an amplifier unit which displays the magnified movement of the probe. Heenan & Froude are showing a scale model of a thrust and cradle designed for the testing of aircraft engines as complete podded units.

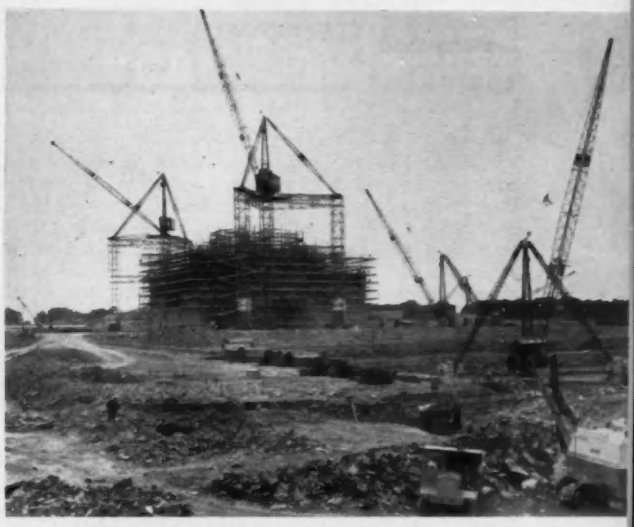
NUCLEAR POWER STATIONS

PROGRESS AT HINKLEY POINT AND BRADWELL

ONE year after the award to the English Electric-Babcock & Wilcox-Taylor Woodrow Atomic Power Group of the contract to build a 500 MW nuclear power station at Hinkley Point, Somerset, work on site is going forward on schedule. Construction of the main biological shield of the first reactor is half completed, and the shield now stands 80ft above general station level. The foundations of the biological shield for the second reactor are also nearing completion. In all, some 60,000 cu yd of rock excavation has been carried out on the main foundations of the two reactors. Deeper excavations for the foundations of the reactor blower houses are now proceeding. Altogether 700,000 cu yd of clay and limestone is being removed.

Twin reinforced concrete subways for conveying the cables from the turbine house to the 275 kV switchgear compound have been completed. Extensive workshop and stores buildings have been constructed west of the main station site to provide facilities for site fabrication of heavy equipment such as steam raising units, reactor pressure vessel, etc. Reinforced concrete foundations are nearly complete for the 250ft gauge track to carry the 240ft high Goliath crane capable of lifting 400 tons.

Heavy plant and equipment will be brought from the works (in Scotland and the North) to site mainly by sea.

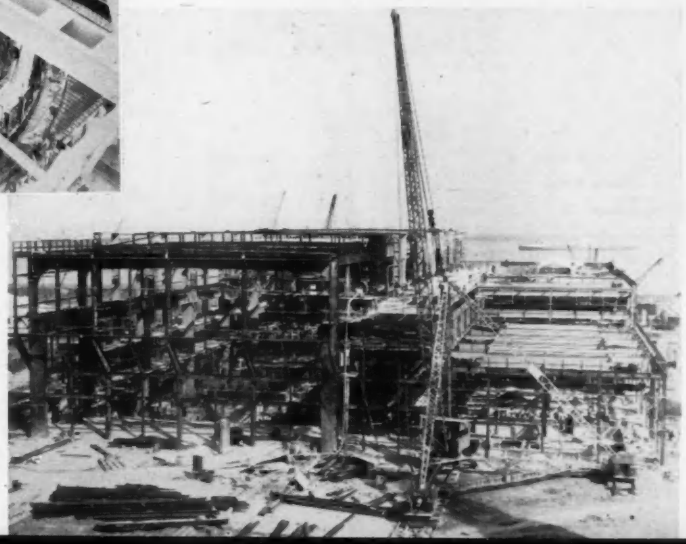


Eastern end of the excavations at Hinkley Point for the turbine hall and cooling water culverts, with No. 1 reactor building in the background; this has now reached a height of 80ft above station level

At Combwich, some four miles from the main site, a wharf capable of handling ships of up to 1,500 tons has been constructed in six months and the first load arrived by sea during August. A 3,500ft long seawall is nearly finished and an 18ft diameter access shaft for the tunnels has been sunk 80ft deep and work is now in hand driving the access tunnel under the foreshore. A temporary dry dock in which the cooling water intake structure caisson will be built, and from which it will be later floated to site, has been completed on the foreshore west of the main station site. Rock excavation for the turbine house and associated cooling water culverts began in May and is now nearly half completed and concreting of the foundations started in July.

Accommodation and amenities for some 450 men were completed by March and these are being extended; at the present time a total of about 1,450 men are employed on site. The station is due for commissioning in 1962.

Rapid progress is still being made in the construction of the Bradwell (Essex) station by the Nuclear Power Plant Co., Ltd. We reproduce two photographs recently taken on the site. One shows that the erection of the framework of the main turbine house is well advanced. The other is a view of the interior of the No. 1 reactor.



Above: Looking down into the interior of Bradwell's No. 1 reactor. Right: The main turbine house of the Bradwell station

DOMESTIC ELECTRICAL EQUIPMENT

ELECTRIC COOKERS

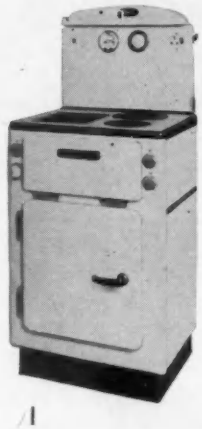
ALTHOUGH the number of homes in this country equipped with electric cookers is still not as great as those with gas cookers, it is estimated that there are now over three million users of electric cookers and there is no reason why the number should not increase in the future. Apart from their greater cleanliness, due to the absence of products of combustion, present-day electric cookers appeal for several reasons. Now that the fast-heating radiant type boiling plates have either replaced or supplemented the older solid boiling plates one of the chief objections to the use of an electric cooker—the fact that it was slow to heat up and showed no visible signs of heat—has now been removed.

Oven control is almost without exception thermostatic, and nearly all of the latest types of electric cookers are automatically controlled or can be adapted by fitting an automatic control panel.

The additional feature of an eye-level grill has been incorporated in the G.E.C. " Supreme " and the Jackson Model 396J, two of the cookers which have been placed on the market since our last survey of the subject, and Simplex have introduced the Creda " Mercury 315," a cooker which makes several departures from normal British cooker design. It is provided with three extra rapid boiling discs, each rated at 3 kW and fitted with energy regulators, and the grill is placed in a recess in the oven roof. The latest addition to the Revo range of cookers is the " Revo-Luxe " which is fitted with a glass splashplate, while Tricity Cookers now incorporate as standard an inner glass oven door for their " Viscount 575 " model and have also produced a new cooker, the " Marquis 580," with automatic control and hob floodlight.

Plate racks are not usually associated with electric cookers, but these can now be fitted to the Allied Ironfounders' " Royal " cookers as an optional extra.

Manufacturer	Name or Model	Type	Size (H.W. & D. in inches)	Oven Type	Oven Size (H.W. & D. in inches)	Oven Loading	Type of Element	Oven Control
ALLIED IRONFOUNDERS, LTD., Electrical Appliance Division, 28, Brook Street, London, W.1.	Falco " Royal " Mark III	Vertical, plinth	49×23×23½ (36in to top of hob)	Removable (5-piece)	16½×17½×15½	3,500 W	Sheathed plug-in	Thermostatic and auto-timer
	Falco " Royal " Mark IV	Vertical, plinth	49×23×23½ (36in to top of hob)	Removable (5-piece)	16½×17½×15½	3,500 W	Sheathed plug-in	Thermostatic and auto-timer
	Falco " Freedom "	Vertical, plinth	36×22½×19½	Removable (3-piece)	13×13×14½	2,400 W	Plug-in ceramic	Thermostatic and auto-timer
	16B	Vertical, plinth	36×22½×19½	Removable (3-piece)	13×13×14½	2,400 W	Plug-in ceramic	Thermostatic
	" Moray "	Vertical, plinth	42×20×22 (36in to top of hob)	Removable sides	14×14×14½	2,500 W	Plug-in ceramic	Thermostatic
BELLING & CO., LTD., Southbury Road, Enfield, Middlesex.	64AB Streamline	Vertical	37×23½×23	Removable (one-piece)	16×15×13	3,400 W	—	Thermostatic
	47AB	Vertical	36×21×21	Removable (one-piece)	16×13×13	2,500 W	—	Thermostatic
	45A " Baby Belling "	" Baby "	21×18×15½	Fixed	11½×13×13	1,200 W	—	Three heat
	51 " Wee Baby Belling "	" Baby "	12×13½×11½	Fixed	9½×9×9½	600 W	—	Three heat
	51H " Twin Baby Belling "	" Baby "	12×21×13	Fixed	9½×9×9½	600 W	—	Three heat
	52 " Baby Belling "	" Baby "	14×17×16	Fixed	11½×11½×11½	1 kW	—	Three heat
	53 " Big Baby Belling "	Stand or cabinet	36×21×16	Fixed	11½×11½×11½	1,000 W	—	Three heat



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1. *Belling "64-Plus" automatic cooker*
2. *Belling model 52 "Baby" cooker*
3. *Allied Ironfounders "Moray" 3-plate cooker*

Hot Plates	Grill or Grill Boiler	Hot Cupboard or Grill Compartment (H.W. & D. in inches)	Storage Drawer (H.W. & D. in inches)	Storage Drawer Loading	Special Features	Finish	Price
Two 8in radiant 2 kW each One 6½in radiant 1·2 kW Simmer control	3 kW grill Simmer control	4×17½×16	—	—	Auto-timer control with warning pinger on both oven and R.H. 8in hotplate	White, cream, pastel blue and pastel green	£84 0 0 (oven light £2 extra; plate rack £3 extra)
Two 8in radiant 2 kW each Two 6½in radiant 1·2 kW each Simmer control	3 kW grill Simmer control	4×17½×16	—	—	Auto-timer control with warning pinger on both oven and R.H. 8in hotplate	White, cream, pastel blue and pastel green	£92 8 0 (oven light £2 extra; plate rack £3 extra)
One 8in solid 1·8 kW Simmer control One 6½in solid 1 kW three heat	10½×8 grill boiler solid 2 kW	5×18×13½	5½×16½×17 (unheated)	—	Auto-timer, warning pinger radiant plates and additional "Simmerstats" optional extras	Cream or white with cream, white or black hob	£52 18 0
One 8in solid 1·8 kW One 6½in solid 1 kW three heat	10½×8 grill boiler 2 kW	5×18×13½	5½×16½×17 (unheated) optional extra	—	Drop-down door, self-indicating switch knobs, radiant plates and additional "Simmerstats" optional extras	Cream, green and cream, white with cream, white or black hob	£38 5 0
One 8in radiant Simmer control (plus one 6½in solid on 3-plate model)	10½×8 grill boiler 2 kW	6×12×16½	Storage drawer £1 18s extra	—	Cast-iron and sheet steel construction	Cream, white or pastel blue	£32 7 6 (2-plate) £34 19 0 (3-plate)
One 8in 2½ kW One 6½in 1 kW "Simmerstat" controlled	10½×8in 2·3 kW grill boiler	7×16½×16½	—	—	Inner glass door, automatic oven floodlight and (as extra) wheels with brake	White or cream vitreous throughout. (Colours available)	£56 0 0
One 8in 2 kW ("Simmerstat" controlled) and one 6½in 1 kW (three-heat control)	10½×8in 2·3 kW grill boiler	6×18½×15½	4×16×15	—	Inner glass door	White or cream vitreous throughout. (Colours available)	£36 6 0
—	10½×8in 2 kW grill boiler	4½×17½×15	—	—	Available on stand (£2 4 0 extra) or cabinet (£4 8 0 extra)	White or cream vitreous throughout	£16 0 0
—	9×7in 1·5 kW grill boiler	—	—	—	—	Cream vitreous enamel	£8 12 0
One 6½in solid 1 kW	9×7in 1·5 kW grill boiler	6×9×9½	—	—	Stand £2 5 0 extra	Cream vitreous enamel	£15 15 0
—	10×7in 2 kW grill boiler	—	—	—	Stand £2 5 0 extra	Cream vitreous enamel	£14 10 0
One 8in solid 1·8 kW	10×7in 2 kW grill boiler	5×19×14	—	—	Switch interlock limits load to 3 kW	Cream vitreous enamel	£21 7 6 (on stand) £23 10 0 (on cabinet)

Manufacturer	Name or Model	Type	Size (H.W. & D. in inches)	Oven Type	Oven Size (H.W. & D. in inches)	Oven Loading	Type of Element	Oven Control
BELLING & CO., LTD., Southbury Road, Enfield, Middlesex. *(continued)*	29	Table	9×16½×12	—	—	—	—	—
	" 53-Plus "	Stand or cabinet	36×21×16	Fixed	11½×11½×11½	1,000 W	—	Thermostatic
	" 47T "	Vertical	36×21×21	Removable (one-piece)	13×13×16	2,500 W	—	Thermostatic
	" 47-Plus "	Vertical	36×21×21	Removable (one-piece)	13×13×16	2,500 W	—	Thermostatic
	" 64-Plus "	Vertical	37×23½×23	Removable (one-piece)	16×15×13	3,400 W	—	Thermostatic
CARRON COMPANY, Carron, Falkirk.	L.2	Vertical, legs or plinth	36×22×21	Fixed with single element in bottom	12⅝×14¾×14	2,400 W	Plug-in special finned sheathed type	Thermostatic
	L.3	Vertical, legs or plinth	36×22×21	Fixed with single element in bottom	12⅝×14¾×14	2,400 W	Plug-in special finned sheathed type	Thermostatic
	L.75	Plinth	36×22×21	Fixed with single element in bottom	12⅝×14¾×14	2,400 W	Plug-in special finned sheathed type	Thermostatic
CREDA (SIMPLEX ELECTRIC CO., LTD.), Creda Works, Blythe Bridge, Staffs.	" Carefree "	Vertical	53½×21×25 (36in to top of hob)	Fixed, removable sides	15½×14×14½	2,500 W	Tubular sheathed	Thermostatic
	" Stargazer " 310 and 305	Vertical	43½×18½×23½ (36in to top of hob)	Fixed, removable sides	13⅜×12⅝×14⅝	2,200 W	Tubular sheathed	Thermostatic
	" Star " 310 and 305	Vertical, leg model	43½×18½×23½ (36in to top of hob)	Fixed, removable sides	13⅜×12⅝×14⅝	2,200 W	Tubular sheathed	Thermostatic
	" Super Comet " D.H.6	Horizontal	50½×36½×25½ (36in to top of hob)	Fixed, removable sides and base	15×14½×16⅝	3,450 W	Tubular sheathed	Thermostatic

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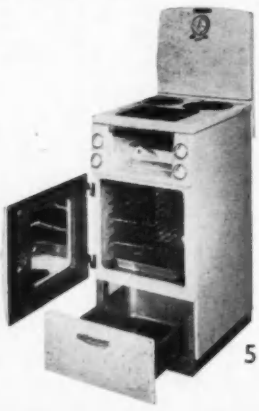

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4. *Simplex " Creda Mercury 315 "*
5. *Creda " Stargazer " 310 cooker*
6. *Belling 47AB cooker*
7. *Carron model L.2*
8. *Carron model L.75*

Hot Plates	Grill or Grill Boiler	Hot Cupboard or Grill Compartment (H.W. & D. in inches)	Storage Drawer (H.W. & D. in inches)	Storage Drawer Loading	Special Features	Finish	Price
—	10½ × 8in 2·3 kW grill boiler	7 × 10¾ × 12¾	—	—	Three heat or "Simmerstat" control	Cream vitreous enamel	£7 19 6 (three heat) £8 15 0 ("Simmerstat")
One 8in solid 1·8 kW	10 × 7in 2 kW grill boiler	5 × 19 × 14	—	—	Auto-oven timer, built-in timer and pilot light	Cream vitreous enamel	£33 4 0 (on stand) £35 7 0 (on cabinet)
One 8in solid 2 kW "Simmerstat" controlled, one 6½in solid 1 kW three heat	10½ × 8in 2·3 kW grill boiler	6 × 18½ × 15½	4 × 16 × 15 (unheated)	—	Auto-oven timer, built-in timer and clock	Cream vitreous enamel. (Colours available)	£43 19 0
One 8in solid 2 kW "Simmerstat" controlled One 6½in solid 1 kW three heat	10½ × 8in 2·3 kW grill boiler	6 × 18½ × 15½	4 × 16 × 15 (unheated)	—	Auto-oven timer, built-in timer, tubular lamp floodlight, built-in 13A socket outlet	White or cream. (Colours available)	£49 3 0
One 8in solid 2·25 kW One 6½in solid 1 kW "Simmerstat" controlled	10½ × 8in 2·3 kW grill boiler	7 × 16½ × 16½	—	—	Auto-oven timer, built-in timer, tubular lamp floodlight, built-in 13A socket outlet	White or cream. (Colours available)	£69 17 6
One 8in solid 1,800 W "Simmerstat" control	10½ × 8in solid 2 kW grill boiler	5 × 19 × 15	—	—	Extra wide oven, glass door 10s 9d extra	Cream with black hob or two-tone colours £1 extra	£30 13 0 (leg) £32 5 0 (plinth)
One 8in solid 1,800 W "Simmerstat" control One 6½in solid 1 kW three-heat control	10½ × 8in solid 2 kW grill boiler	5 × 19 × 15	—	—	Extra wide oven, glass door 10s 9d extra	Cream with black hob or two-tone colours £1 extra	£33 7 0 (leg) £34 19 0 (plinth)
One 8in solid 1,800 W "Simmerstat" control One 6½in solid 1 kW three-heat control	10½ × 8in solid 2 kW grill boiler	5 × 19 × 15	—	—	—	All cream or white	£34 19 0
One 8in radiant 2·2 kW "Simmerstat" controlled One 6½in solid 1 kW	10½ × 8 grill boiler 2 kW	4½ × 17½ × 12½	7½ × 17 × 15½	400 W	Time clock, illuminated hob. Glass door £2 14s extra	Grey/cream, grey/white, all cream or all white, colours extra	£52 10 0
One 8in solid 2 kW "Simmerstat" controlled One 6½in solid 1 kW three heat (model 305—8in plate only)	10½ × 8 grill boiler 2 kW	4½ × 11¾ × 17	7 × 13½ × 17½ (unheated)	—	Glass door standard, storage drawer £1 18s extra, timer control £8 12s extra	Cream or white, colours extra	£34 19 0 (310) £32 5 0 (305)
One 8in solid 2 kW "Simmerstat" controlled One 6½in solid 1 kW three heat (model 305—8in plate only)	10½ × 8 grill boiler 2 kW	—	—	—	Solid door	Grey and white, cream	On application
Two 8in radiant 2 kW each Two 6½in radiant 1 kW each all auto controlled	Separate grill 1,500 W	5½ × 13½ × 14½	6½ × 13½ × 16	400 W	Auto-time control, illuminated hob, drop-down oven door, grill warming drawer	Cream or white	£131 14 0

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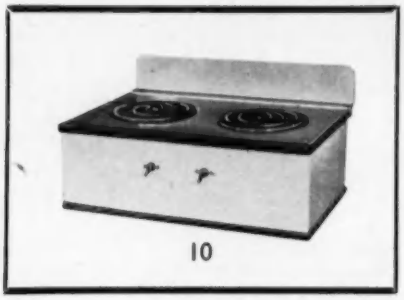

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Manufacturer	Name or Model	Type	Size (H.W. & D. in inches)	Oven Type	Oven Size (H.W. & D. in inches)	Oven Loading	Type of Element	Oven Control
CREDA (SIMPLEX ELECTRIC CO., LTD.), Creda Works, Blythe Bridge, Staffs. *(continued)*	Mercury 315	Vertical	41¾ × 20 × 22½	Fixed removable sides	15 × 14 × 15½	2,500 W	Tubular sheathed	Thermostatic
DEXRAY ENGINEERING CO., LTD., 34, Ardwick Green South, Manchester, 13.	C.2	Table	13 × 21 × 15	—	—	—	—	—
	C.10	Table	13 × 21 × 15	—	—	—	—	—
ENGLISH ELECTRIC CO., LTD., Queens House, Kingsway, London, W.C.2.	2020	Plinth, raised oven	61 × 25½ × 26 (30in to top of hob)	Fixed, removable element guards	14¾ × 14½ × 13½	2,500 W	Two banks of spirals and two rod type	Thermostatic
	2030	Plinth	36 × 21 × 22¾	Fixed, removable element guards and base plate	13¾ × 13⅝ × 17½	2,600 W	Two tubular sheathed	Thermostatic
	2031	Plinth	36 × 21 × 22¾	Fixed, removable element guards and base plate	13¾ × 13⅝ × 17½	2,600 W	Two tubular sheathed	Automatic oven timer and thermostat
GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2.	DC114	Vertical plinth	44 × 21 × 21	Removable (3-piece)	13 × 13½ × 15½	2,450 W	Sheathed wire	Thermostatic
	DC757D DC757GD "Quality"	Vertical plinth	43¼ × 18⅛ × 21	Removable (3-piece)	13½ × 13⅜ × 14⅝	2,425 W	Sheathed wire	Thermostatic
	DC457D "Quality"	Vertical plinth	43¼ × 18⅛ × 21	Removable (3-piece)	13½ × 13⅜ × 14⅝	2,425 W	Sheathed wire	Thermostatic
	DC120 DC124 "Supreme"	Vertical plinth	54 × 22 × 24	Removable (3-piece	13½ × 16½ × 15½	3,395 W	Sheathed wire	Thermostatic
L. G. HAWKINS & CO., LTD., 30-35, Drury Lane, London, W.C.2.	LGH600/601 "Ovenette"	Portable	8 × 14 diameter	—	—	700 W	Annular channel heating	—

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9. *English Electric model 2031*
10. *Dexray model C.10 2-plate radiant portable cooker*
11. *G.E.C. model DC120 "Supreme" cooker with eye-level grill*
12. *L. G. Hawkins "Ovenette" portable cooker*
13. *G.E.C. DC757GD "Quality" cooker*

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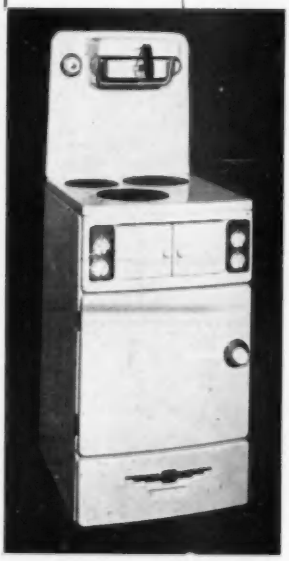
Hot Plates	Grill or Grill Boiler	Hot Cupboard or Grill Compartment (H.W. & D. in inches)	Storage Drawer (H.W. & D. in inches)	Storage Drawer Loading	Special Features	Finish	Price
Three 7¼in dia. Creda Quick Discs all auto controlled	Separate grill 2,250 W	—	9¼ × 17 × 18	400 W	Extra rapid boiling plate, easy to clean hob, large grill. (Glass door, timer and oven interior light on de-luxe model)	Cream or white	£35 14 0 £40 19 0 (de-luxe)
One 6½in solid 1 kW "Simmerstat" controlled	10½ × 8 grill boiler 2 kW three heat	11 × 6½ × 14	—	—	—	Vitreous enamelled top-plate, cream body	£12 5 0
Two 6½in radiant	—	—	—	—	—	Vitreous enamelled top-plate, cream body	£12 18 4
Two 8in radiant 1·8 kW each and one 6½in radiant 900 W "Simmerstat" controlled	13 × 8in 2·5 kW grill in oven ("Simmerstat" controlled)	6½ × 22 × 15½ (400 W)	13⅜ × 22 × 24 (storage cupboard)	—	Grill "booster" control for rapid oven pre-heating, auto-control oven and hot cupboard	Cream or white and with colour hob	£75 0 0
One 8in solid 1·8 kW "Simmerstat" controlled and one 6½in solid 1 kW three heat	10½ × 8in 2·5 kW grill boiler (three heat)	4⅜ × 13½ × 15½	5¼ × 17⅜ × 18	—	Interior oven light, lipped hob. Hob light and glass oven door optional extras	Champagne or white	£37 12 6
One 8in solid 1·8 kW "Simmerstat" controlled and one 6½in solid 1 kW three heat	10½ × 8in 2·5 kW grill boiler (three heat)	4⅜ × 13½ × 15½	5¼ × 17⅜ × 18	—	Auto control panel with timer and 5-hr ringer, interior oven light, lipped hob. Hob light and glass oven door optional extras	Champagne or white	£44 12 6
One 8in solid 1·8 kW Simmer switch controlled One 6½in solid 1 kW three heat	10½ × 8in grill boiler 2 kW	6½ × 17⅞ × 18½	5¼ × 13½ × 20	400 W	Drop down oven door, auto-control panel £11 12 0 extra	Green and cream, two-tone ivory, white or white with black hob	£42 3 0
One 8in solid 1·8 kW Simmer switch controlled One 6½in solid 1 kW three heat	10½ × 8in grill boiler 2 kW	6 × 11⅞ × 16⅜	6 × 12 × 20	—	Auto-control panel £10 15 0 extra. Storage drawer. Full view glass door and storage drawer (DC757GD)	Honeysuckle or gleaming white	£36 17 0 (DC757D) £37 13 0 (DC757GD)
One 8in solid 1·8 kW Simmer switch controlled	10½ × 8in grill boiler 2 kW	6 × 11⅞ × 16⅜	6 × 12 × 20	—	Auto-control panel £10 15 0 extra. Storage drawer	Honeysuckle or gleaming white	£34 3 0
DC120: Two 8in "Superspeed" radiant 2,350 W Simmer controlled. One 6½in "Superspeed" radiant 1,300 W Simmer controlled. DC124: As above plus one 6½in "Superspeed" radiant 1,300 W Simmer controlled	12⅜ × 8⅜in eye level grill 2 kW	—	7⅛ × 16¾ × 20½	485 W	Eye level grill, auto timer, large oven below hob	Honeysuckle or gleaming white. Switch panel in Dresden blue, guardsman red or olive green	£74 0 0 (DC120) £79 0 0 (DC124)
—	Grilling can be done in oven	—	—	—	Viewing cooking window, capacity increasing collar	Aluminium	£4 19 6

Manufacturer	Name or Model	Type	Size (H.W. & D. in inches)	Oven Type	Oven Size (H.W. & D. in inches)	Oven Loading	Type of Element	Oven Control
C. HOUNSLOW & CO., LTD., Chalex Works, Southwick, Sussex.	"Regal"	Breakfast	7×9½×12½	—	4×11×8	—	—	—
	"Chalex"	Table	7¾×17×11½	—	6½×11½×10½	—	Wide porcelain	Three heat
JACKSON ELECTRIC STOVE CO., LTD., Dallow Road, Luton, Beds.	69 "Giant"	Table	16×18×18½	Fixed	8½×10×13½	1,100 W	Tubular sheathed (base) spirals (top)	Thermostatic
	192J	Vertical, drawer	44½×21×17¾ (36in to top of hob)	Removable element guards	12⅝×12½×16½	1,780 W	Plug-in spirals in ceramic tubes	Thermostatic
	194J	Vertical, drawer	44½×21×21 (36in to top of hob)	Removable element guards	12⅝×12½×16½	2,100 W	Plug-in spirals in ceramic tubes	Thermostatic
	390J	Vertical, legs, plinth, drawer	45×20½×22½ (36in to top of hob)	Removable element guards	14½×13½×15⅝	2,500 W	Tubular sheathed	Thermostatic
	391J	Vertical, legs, plinth, drawer	45×20½×22½ (36in to top of hob)	Removable element guards	14½×13½×15⅝	2,500 W	Tubular sheathed	Thermostatic
	394J	Vertical, plinth, drawer	45×20½×22½ (36in to top of hob)	Removable element guards	14½×13½×15⅝	2,500 W	Tubular sheathed	Thermostatic
	396J	Vertical, eye-level grill, drawer	45×20½×22½ (36in to top of hob)	Removable element guards	14½×13½×15⅝	2,500 W	Tubular sheathed	Thermostatic
MOFFATS, LTD., 1, Newman Street, London, W.1.	40C90W	Horizontal	49×40×28½	Fixed, two ovens	15½×21×20 and 15½×13½×20	"Bakemaster" Top: 3 kW Bottom: 2·4 kW "Thrift" Top: 3 kW Bottom: 1·5 kW	Spiral and "Conrad"	Synchromatic
	30C75W	Vertical	49×30×28½	Fixed	15½×24×18½	Top: 3·3 kW Bottom: 2·4 kW	Spiral and "Conrad"	Synchromatic
	24C80W	Vertical	49×24×28½	Fixed	15½×21×20	Top: 3 kW Bottom: 2·4 kW	Spiral and "Conrad"	Synchromatic



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14. *Jackson model 396J cooker with eye-level grill*

15. *"Revo-Luxe" cooker with glass splash plate*

16. *One of the latest Moffat 40in ranges*

17. *Tricity "Popular" cooker*

18. *Tricity Cookers "Marquis 580"*

Hot Plates	Grill or Grill Boiler	Hot Cupboard or Grill Compartment (H.W. & D. in inches)	Storage Drawer (H.W. & D. in inches)	Storage Drawer Loading	Special Features	Finish	Price
—	9×7in 750 W grill boiler	—	—	—	—	Sage green stoved enamel	£3 0 0
—	10×8in 1·8 kW grill boiler	—	—	—	—	Grey mottled stoved enamel	£6 17 9
One 7in radiant "Simmerstat" controlled	Grill in top of oven 800 W	10½×5½×13½	—	—	Stand complete with potshelf £2 0 0 extra	Cream and black or white and black or eau-de-nil turquoise top	£19 10 0
One 8in solid "Speedring" 2 kW (six heat)	10½×8in 2 kW grill boiler	4½×18×13¾	6×16½×14½	500 W	Glass oven door. Auto-control unit, radiant hotplates and "Simmerstats" extra	Two-tone ivory or all white	£40 10 0 (cold drawer) £42 12 6 (heated drawer)
One 8in solid "Speedring" 2 kW One 6½in solid "Speedring" 1·350 kW (six heat)	10½×8in 2 kW grill boiler	4½×18×18½	6×16½×19	500 W	Glass oven door. Auto-control unit, radiant hotplates and "Simmerstats" extra	Two-tone ivory or all white	£45 15 0 (cold drawer) £47 17 6 (heated drawer)
One 8in solid 2 kW "Speedring" (six heat)	10½×8in grill boiler 2 kW	4½×12½×17½	8½×17½×14½ (unheated)	—	"Cookalone" auto-control unit, radiant hotplate and "Simmerstat" extra	All cream or all white or with eau-de-nil or turquoise blue relief on splash plate, hob and plinth or drawer front	On application (legs) £32 5 0 (plinth) £34 3 0 (drawer)
One 8in solid "Speedring" 2 kW (six heat) One 6½in solid "Speedring" 1·350 kW (six heat)	10½×8in grill boiler 2 kW	4½×12½×17½	8½×17½×14½ (unheated)	—	"Cookalone" auto-control unit, radiant hotplates and "Simmerstat" extra	All cream or all white or with eau-de-nil or turquoise blue relief on splash plate, hob and plinth or drawer front	On application (legs) £34 19 0 (plinth) £36 17 0 (drawer)
One 8in solid "Speedring" 2 kW (six heat) One 6½in solid "Speedring" 1·350 kW (six heat)	10½×8in 2 kW	4½×12½×17½	8½×17½×14½	500 W	Glass oven door. "Cookalone" auto-control unit, radiant hotplates and "Simmerstat" extra	All cream or all white or with eau-de-nil or turquoise blue relief on splash plate, hob and plinth or drawer front	£37 7 6 (plinth) £39 7 6 (cold drawer) £42 7 6 (heated drawer)
Two 8in solid "Speedring" each 2 kW (six heat) One 6½in solid "Speedring" 1·350 kW (six heat)	Eye-level grill 2 kW	4½×12½×17½	8½×17½×14½	500 W	Eye-level grill, glass oven door, "Cookalone" auto-control unit, oven roof protector, girdle plate	All cream or all white	£70 0 0
One "Thermo-Guard" 2·2 kW, one at 1·9 kW, three at 1·3 kW each	Top oven element for grilling	All ovens have "warm" position	Two: 9×21×20 and 9×13½×20	—	"Hi-Lo-Matic" oven racks	Titanium white	£198 0 0
One "Thermo-Guard" 2·2 kW, three at 1·3 kW	Top oven element for grilling	All ovens have "warm" position	9×24×18½	500 W	"Hi-Lo-Matic" oven racks	Titanium white	£154 0 0
One "Thermo-Guard" 1·3 kW, one at 1·9 kW, two at 1·3 kW	Top oven element for grilling	All ovens have "warm" position	9×21×20	500 W	"Hi-Lo-Matic" oven racks	Titanium white	£133 0 0

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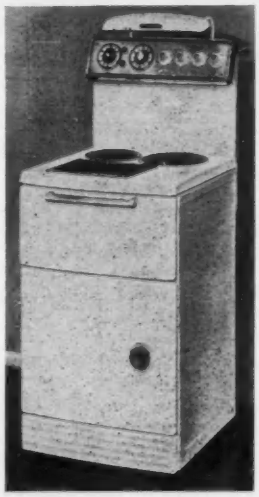

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Manufacturer	Name or Model	Type	Size (H.W. & D. in inches)	Oven Type	Oven Size (H.W. & D. in inches)	Oven Loading	Type of Element	Oven Control
REVO ELECTRIC CO., LTD., Tipton, Staffs.	"Revomatic"	Vertical, plinth	53½ × 23 × 24 (36in to top of hob)	Removable	14 × 15⅜ × 13⅜	2,100 W	Sheathed	Thermostatic
	"Regal"	Vertical, plinth	48⅜ × 23 × 24 (36in to top of hob)	Removable	14 × 15⅜ × 13⅜	2,100 W	Sheathed	Thermostatic
	"Regent" 553	Vertical, plinth or utensil drawer	45 × 21 × 21½ (36in to top of hob)	Removable	13⅜ × 13⅞ × 14	2,100 W	Sheathed	Thermostatic
	"Peerless" Major	Table, or on stand or cabinet	17⅜ × 21 × 15½	Fixed	12¼ × 11⅜ × 13	Grill: 2,000 W Bottom: 900 W	Spiral on ceramic former	Thermostatic
	"Revo-Luxe"	Vertical, utensil drawer	53 × 21 × 23 (36in to top of hob)	Removable	13⅜ × 14¾ × 15	2,100 W	Tubular interchangeable	Thermostatic

Hot Plates	Grill or Grill Boiler	Hot Cupboard or Grill Compartment (H.W. & D. in inches)	Storage Drawer (H.W. & D. in inches)	Storage Drawer Loading	Special Features	Finish	Price
One 8in solid and one 8in radiant 1·8 kW each, "Simmerstat" controlled	16 × 8 grill boiler 3 kW	5½ × 16¾ × 20	4 × 17⅜ × 16½ (unheated)	—	Choice of five separate coloured hobs	Standard body colours—white or cream. Standard hob colours—ancona black, two-tone ivory; Windsor grey. Option of 5 coloured hobs (extra)	£74 10 0
Two 8in solid 1·8 kW each, one "Simmerstat" controlled, one three heat	10½ × 8 grill boiler 2·2 kW	5½ × 16¾ × 20	4 × 17⅜ × 16½ (unheated) optional extra	—	Choice of five separate coloured hobs; option of time control		£39 0 0
One 8in solid 1·8 kW "Simmerstat" controlled One 6¼in solid 1 kW three heat	10½ × 8 grill boiler 2·2 kW	5 × 13 × 19	—	—	Utensil compartment, choice of coloured hobs; glass door and time control optional		£34 18 0 (plinth) £36 8 0 (utensil drawer)
One 6¼in solid 1 kW "Simmerstat" controlled	10 × 7 grill boiler 2 kW	10⅛ × 7 × 13	—	—	Suitable for 13A outlet. Radiant hotplate extra	Grey and white or grey and cream; option of coloured hobs	£20 18 6
One 8in 1·8 kW One 6¼in 1 kW (one "Simmerstat" controlled, one three-heat)	10½ × 8 2·2 kW	5⅜ × 14¾ × 18	6 × 14¾ × 18 (unheated)	—	Choice of five colours for hob and control panel; option of time-control, glass splash plate	White or cream. Option of coloured hob and control panel	£45 3 0 £49 7 0 (with time-control)

Manufacturer	Name or Model	Type	Size (H.W. & D. in inches)	Oven Type	Oven Size (H.W. & D. in inches)	Oven Loading	Type of Element	Oven Control
TRICITY COOKERS, LTD., 109, Kingsway, London, W.C.2.	"Popular" 528	Vertical	36 × 19¾ × 16	Fixed	10⅛ × 11½ × 12½	1,150 W	Coil former	Thermostatic
	"Trivet" 555	Breakfast	10 × 19⅛ × 11	—	—	—	Spiral	—
	"Viscount" 575	Vertical	50⅞ × 21 × 23½ (36in to top of hob)	Removable sides	15½ × 15 × 15½	2,400 W	Plug-in tubular	Thermostatic
	"Marquis" 580	Vertical	53 × 21 × 24¼	Removable sides	15½ × 15 × 15½	2,400 W	Plug-in tubular	Thermostatic

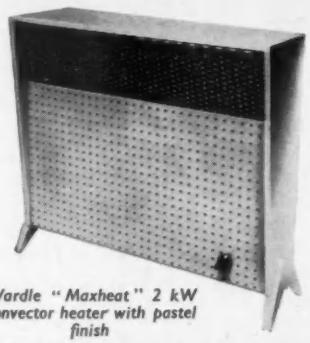
Hot Plates	Grill or Grill Boiler	Hot Cupboard or Grill Compartment (H.W. & D. in inches)	Storage Drawer (H.W. & D. in inches)	Storage Drawer Loading	Special Features	Finish	Price
One 6¼in solid 1 kW three heat	10½ × 8 grill boiler 2 kW	4 × 11½ × 12¾	—	—	Selector switch enables cooker to be used off 13/15A circuit	Ivory or white	£21 7 0 £24 11 6 (with cabinet)
—	Grill boiler 2·25 kW	5½ × 11 × 10	—	—	Suitable for use in dining room	Grey doors, white hob, endplates in choice of four colours	£12 0 0
One 6¼in solid 1 kW, one 8in solid 1·8 kW "Simmerstat" controlled	Grill boiler 2·25 kW	7⅛ × 18 × 18⅛	—	—	Large oven, inner glass oven door. Time switch £5 5s 0 extra	Ivory or white with choice of coloured facia panels	£38 17 0
One 8in radiant, one 6¼in radiant	Grill boiler 2·25 kW	7⅛ × 18 × 18⅛	—	—	Large oven, auto time switch, hob floodlight, oven light, inner glass oven door	Ivory or white	£57 18 0

NEW ELECTRICAL EQUIPMENT

Convector Heaters

The new "Maxheat" convector heater, recently announced by the WARDLE ENGINEERING CO., LTD., Old Trafford, Manchester, is alternatively available with an outer casing of wood veneers, or wood, finished in two harmonious pastel colours. The inner casing is of heavy gauge steel and this, in conjunction with the design of the internal ducting, ensures that surfaces will attain only minimum temperatures.

Models are available in 1 and 2 kW



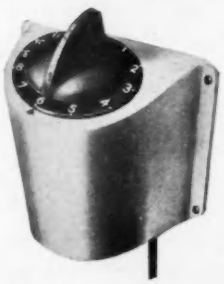
Wardle "Maxheat" 2 kW convector heater with pastel finish

sizes for domestic use and 1, 2 and 3 kW sizes for industrial purposes. The 2 kW domestic models are also available with a heat regulator.

The prices, including purchase tax, range from £11 18s 10d (1 kW domestic, pastel finish) to £15 6s 3d (2 kW domestic, veneer, with regulator). The industrial models are priced at £10 14s 9d (1 kW), £11 6s 7d (2 kW) and £13 0s 4d (3 kW).

Time Switch

A time-switch control, designed primarily to operate with oil-filled electric radiators, has been introduced by HURSEAL, LTD., 229, Regent Street, London, W.1. The Hurseal time-switch will control 15 A on a 12 hour cycle and may be connected for either lighting or heating or both simultaneously. It can be screwed permanently to the skirting board adjacent to the 13 or 15 A plug it is to control. Time-switch control of this description is recommended only for use with electrical appliances with totally enclosed elements and which are inherently safe from all risk of fire. The retail price of the new Hurseal time-switch is £2 19s 6d.



Hurseal time switch

Neutron Detectors

Two neutron detectors for the safe and accurate control of nuclear reactors and capable of operating efficiently at temperatures up to approximately 200 deg C have been developed by PLESSEY NUCLEONICS, LTD., Weedon Road, Northampton, Northants. They are the PNI 1025, a three electrode ionisation chamber incorporating gamma compensation, and the PNI 1026, a two electrode version. Both detectors are capable of being operated under plant conditions, at the ambient temperatures of the core or shielding, for long periods without attention. They have the minimum possible gamma sensitivity consistent with adequate neutron sensitivity and after operation at high neutron fluxes provide the minimum possible current from residual activities in their structural materials.

Major components of both detectors are of high purity aluminium. Internal insulators and electrode supports are of alumina and the vacuum lead-through seals are of the ceramic to metal bonded type. This form of construction provides for rigid mounting of the electrode assembly quite independent of the vacuum seals and cable terminations. The chambers have a substantial aluminium base plate which shrouds the vacuum seals and carries the cable terminations. The base plate contains stainless steel wire inserts which provide the chamber with substantial support. Completed detectors, before filling, are tested to an internal pressure of 100 p.s.i. Neutron sensitive coatings of either natural or enriched boron can be provided. The chambers are normally filled with hydrogen at pressures of 25, 75 or 225 cm Hg, but alternative fillings can be supplied if required. Polythene insulated sealed terminations designed to take similarly insulated and sheathed cables are fitted for normal and moderate fluxes and temperatures.

Powder Fluxes

A group of new powder fluxes for submerged-arc welding under the generic name of "Muraflux" are being produced by MUREX WELDING PROCESSES, LTD., Waltham Cross, Herts. "Muraflux A," which is the first of these new fluxes, can be used on either a.c. or d.c. supplies with welding currents up to 900 A on all machines suitable for submerged-arc welding.

The flux may be employed with a mild-steel filler wire containing approximately 2 per cent manganese or with a normal mild-steel wire. Both types of wire, known as "Murawire W1" and "Murawire W2," respectively, can be supplied by Murex. When used with "Murawire," "Muraflux A" produces good-quality welds of a high radiographic standard, and it can be employed for Class 1 work. In conjunction with "Murawire" the flux has been granted approval by Lloyd's Register of Shipping and is accepted by the Ministry of Transport. "Muraflux A" is suitable for either the single-pass or multi-pass welding of various joints in mild steel, as well as plug welds and the building up of worn mild steel parts. Good penetration can be obtained, and unfused flux can be recovered and used again.

Intercommunication System

The "Dialog Five" is the latest addition to the "Dialog" transistorised intercommunication system made by CASS ELECTRONICS, LTD., White Hart Yard, Guildford Street, Chertsey, Surrey. The "Dialog Five" allows the installation of up to five intercommunicating master units. Alternatively, substations can be used for communication to one or two masters. In this way a large number of different layouts to meet varying requirements are possible. The system maintains a high clarity of speech not usually associated with ordinary intercommunicating systems. Each master station is powered by two ordinary flat type torch batteries, which will give 12 months' service. The price of the master station, with secrecy switch, volume control and a button for calling other stations is £24 each. The price for the ordinary substation for use on this system with secrecy switch is £4 and that of the substation suitable for alternative communication to two master stations is £6. The "Dialog" exterior waterproof substation can also be used on this system.

Cass Electronics "Dialog Five" intercommunication system

Financial Section

STOCKS and SHARES

AFTER their spell of high activity at rising prices during August, Stock Exchange markets made a quieter entry into the present month. The extent of the recent appreciation in industrial shares has been large enough to encourage a certain amount of profit-taking. At the same time, assessments of the trading outlook over the rest of this year, as envisaged for instance in the Cohen Council's latest report, seemed to cause some hesitation in taking on fresh commitments at the higher market level.

Extent of the Rise

Up to the end of August, industrial share prices had been in the ascendant, with only minor interruptions, for the best part of six months. In this period, the value of popular ordinary shares is calculated to have risen on the average by more than 20 per cent. Electrical shares have been well up with the leaders in this movement. The industrial market was at its lowest ebb last February, so that a comparison, in the accompanying tables, between current prices and the lowest quotations of the year represents in most cases a six-months' change. Among the shares of the big electrical groups, the improvement in English Electric from a low point of 44s to the recent quotation of 56s 3d is notable, while the rises in A.E.I., G.E.C. and Reyrolle all extended to around six or seven shillings, and Crompton Parkinson went from 8s 3d to 12s.

Substantial Recovery

The comparison of current prices with the low points recorded earlier in the year shows that in the cable and telephone group of shares, B.I.C.C. and London Electric Wire recovered to the extent of some six and seven shillings respectively, and Automatic Telephone by 11s 9d. In proportion, the improvements of 5s or more in Ericssons and Hackbridge Holdings, and of 3s 6d in Aberdare Cables, were on a comparable scale. Hoover, with an advance of 15s 6d, recorded one of the best recoveries among domestic equipment shares, and the rise of 4s 6d in Morphy-Richards was also notable. Some of the largest of the other differences were those of 10s upwards in Lancashire Dynamo, Lucas, E.M.I., Metal Industries and British Aluminium. Brook Motors, Decca and Plessey have all risen seven or eight shillings above the bottom prices, and among the low priced shares the best performances included those of Walsall Conduits, Allen West, Switchgear Cowans, S. Smith, Pye and Elliott-Automation.

Reaction

Taking into account the pace and extent of the movements noted above, there was no particular surprise when markets took a breather during the past week, and a short step back from their best price levels. A recession in the gilt-edged market was reflected in falls of half a point in the British Electricity

Price Changes in

Company or Board	Nom. Value	Middle price 1st Sept.	Week's Rise or Fall	Dividend Previous	Dividend Last	Yield % £ s d	1958 Highest	1958 Lowest
Gilt-edged Stocks								
Brit. Elec. 1968/73	100	74½x.d.	−½	3	3	4 0 6	76½	72
Brit. Elec. 1974/77	100	71½	−½	3	3	4 4 0	73½	68½
Brit. Elec. 1976/79	100	77	−½	3½	3½	4 11 0	77½	72
Brit. Elec. 1974/79	100	85	−½	4½	4½	5 0 0	87½	82½
Overseas Electric Supply								
Calcutta Elec.	£1	16/6		6†	6·8†	8 5 0†	16/9	15/-
East African Power	£1	21/-		7½	8	7 12 6	21/-	17/6
Nigerian Elec.	£1	12/6		10	10	16 0 0	17/-	12/6
Perak Hydro-Elec.	£1	15/-		10	12½	16 13 6	15/6	13/6
Electrical Shares								
Aberdare Holdings	5/-	13/3		17½	17½	6 12 0	13/3	9/9
Aerialite	1/-	7/3		48	51½	7 2 0	7/3	5/1
Allen, W. H.	£1	37/3		10	11	5 18 0	37/3	32/9
Anglo-Portuguese Tel.	£1	26/9	−1/-	8	9	6 14 6	27/9	19/9
Aron Elec. Ord.	£1	55/-		15	15	5 9 0	57/6	53/-
Assoc. Elec. Ord.	£1	53/9		15	15	5 11 6	53/9	46/6
Automatic Tel. & El.	£1	68/9		17	17	4 18 9	68/9	57/-
Babcock & Wilcox	£1	48/6	−6d	15	13‡	5 7 3	52/9	41/9
Bakelite	10/-	19/9	+6d	15	15	7 12 0	21/-	17/6
Baldwin, H. J.	2/-	3/-	+3d	20	20	13 6 9	3/9	2/6
Berry's Electric	5/-	7/-	−3d	10	10	7 2 9	7/6	5/9
British Aluminium	£1	53/3		12	12	4 10 3	53/3	37/-
Brit. Elec. Traction: Def. Ord. "A"	5/-	28/-	−1/-	25	25	4 9 3	29/-	19/6
B.I. Callender's	£1	45/-	−2/-	12½	12½	5 11 0	47/-	38/9
B.I. Callender's 6% Pref.	£1	20/-	+1/-	6	6	6 0 0	20/3	19/-
British Tabulating	£1	53/-	−9d	9	10	3 15 6	53/9	38/6
British Thermostat	5/-	30/-		25	30	5 0 0	30/-	19/9
British Vac. Cleaner	5/-	7/9		10	10	6 9 0	7/9	4/6
Brook Motors	10/-	41/3		25	25	6 1 3	41/3	33/3
Bulgin, A. F.	1/-	5/6		40	45	8 2 9	5/6	4/7
Bulpitts	5/-	8/3		—	12½‡	7 11 6	8/3	7/3
Burco Dean	5/-	9/6		20	22½	7 18 0*	9/6	7/9
Cable & Wireless: Ord.	5/-	10/9		10	10‡*	4 13 0	10/9	8/-
4% Loan	100	94		4	4	4 5 0	94½	89
Chloride El. Storage "A"	£1	60/-		17½	17½	5 16 9	62/-	55/6
Clarke Chapman	£1	63/9		27½	27½	4 6 3*	72/6	55/-
Cole, E. K.	5/-	16/6		17½	17½	5 6 0	18/-	15/3
Cossor, A. C.	5/-	4/6	−1/6	2½	Nil	Nil	6/-	4/4
Crabtree	10/-	28/6		20	20	7 0 3	28/6	24/4
Crompton Parkinson Ord.	5/-	12/-		16	16	4 9 0*	12/-	8/3
De La Rue	10/-	25/-	+6d	35	17½*	7 0 0	26/3	20/9
Decca "A"	4/-	28/9		43½	43½	6 1 9	28/9	21/3
Desoutter	5/-	16/6		32½	18½*	5 13 9	16/6	13/6
Dewhurst	2/-	8/3		16½	20	4 17 0	8/3	6/9
Dictograph Tel.	2/-	7/-	+3d	20	20*	5 14 3	7/-	4/7
Dubilier Condenser	1/-	3/6		30	20*	5 14 3	4/3	3/1
Duport	5/-	8/6		25	25	7 7 0*	9/4	7/9
E.M.I.	10/-	37/6	−1/-	15	15	4 0 0	39/6	27/6
Electrical Components	5/-	8/-		12½	12½	7 16 3	8/-	7/-
Elec. Construction	£1	25/-	+1/3	8½	8½	6 16 0	25/-	21/-
Elliott-Automation	5/-	16/-	+3d	—	10‡	3 2 6	16/-	11/6
Enfield Cable Ord.	£1	14/-	−6d	Nil	2½	3 11 6	17/-	10/9
English Electric	£1	56/3		14	14	4 19 6	56/3	44/-
English Electric 3½% Pref.	£1	12/6		3½	3½	6 0 0	12/6	11/9
Ericsson Tel.	5/-	22/9		22†	12*†	2 12 9†	22/9	17/6
Ever Ready	5/-	19/6		37½	20*	5 2 6	19/6	13/9
Falk Stadelmann	£1	37/6	+1/3	17½	17½	9 6 9	38/9	35/-

The above quotations are based upon middle prices in the Stock Exchange Daily Official List.
* After scrip issue. † Free of income tax. ‡ Dividend indicated.

stocks. Among electrical shares there were reactions of between one and two shillings in a few instances, including B.I.C.C. and G.E.C., but generally the changes were of no great consequence. Improvements were not lacking, especially among the shares of companies concerned with the consumer goods expected to benefit from the latest hire-purchase and credit developments. Other firm features included Strand Electric, Southern Areas, Allen West, and Ward & Goldstone.

Electrical Investments

Company or Board	Nom. Value	Middle price 1st Sept.	Week's Rise or Fall	Dividend Previous	Dividend Last	Yield %	1958 Highest	1958 Lowest
Electrical Shares—continued						£ s d		
G.E.C. Ord.	£1	35/-	−1/3	12½	10	5 14 3	38/9	29/3
G.E.C. 6½% Pref.	£1	21/-		6½	6½	6 3 9	21/3	20/3
General Cables	5/-	9/3		30	24	—	11/9	9/3
Greenwood & Batley	£1	48/3		17½	20	8 5 9	48/3	45/-
Hackbridge Holdings	5/-	12/9	−6d	20	20	7 16 9	14/3	7/6
Hackbridge & Hewittic	5/-	13/-		20	20	7 13 9	13/-	9/7
Head Wrightson	5/-	21/9	−3d	22½	17½*	4 0 6	22/3	16/9
Heatrae	2/-	7/-		15	20	5 14 3	7/-	4/-
Henley's	10/-	12/-	−6d	11½	11½	9 11 9	14/6	10/6
Holophane	5/-	13/9		30	37½	8 2 9*	13/9	12/6
Hoover	5/-	46/6	+1/6	50	50	5 7 6	46/-	31/-
I.C.I.	£1	33/-	−6d	10	12	4 17 0*	33/6	23/9
Intl. Combustion	5/-	27/6	+6d	22½	25	4 11 0	27/6	19/3
Johnson & Phillips	£1	16/3	−2/6	10	5	6 3 0	25/-	15/-
Lancashire Dynamo	£1	40/-		11	11	5 10 0	40/-	28/6
Laurence Scott	5/-	15/3		15	15	4 18 3	14/9	12/6
Lister, R. A.	£1	26/3		10	10	7 12 6	26/3	23/-
London Elec. Wire	£1	46/9		12½	12½	5 7 0	46/9	39/6
Lucas, J.	£1	38/9	−3d	7½	7½	3 17 6	39/-	27/9
Marconi Marine	£1	34/-		10	10	5 17 9	34/-	29/-
Marryat & Scott	2/-	6/9		35	37½	5 11 0	14/-	10/3
Mather & Platt	£1	39/3	−3d	15	15	5 2 0*	40/-	29/6
Metal Industries	£1	35/9		9	14	7 16 6	35/9	22/9
Midland Elec. Mfg.	£1	47/6		12½	12½	5 5 3	48/3	44/-
Morphy-Richards	4/-	19/-	+6d	50	20*	4 4 3	19/-	14/6
Murex	£1	50/6		20	17½	6 18 6	58/3	48/-
Newman Ind.	2/-	2/3		10	10	8 17 9	2/9	2/3
Oldham & Son	1/-	2/6		17½	17½	7 0 0	2/7	2/3
Parnall (Yate)	5/-	17/6		12	12	3 8 6	17/6	5/9
Parsons, C. A.	£1	47/6	−1/3	8½	7½*	3 3 3	53/6	43/-
Plessey	10/-	63/3		30	30	4 14 9	63/3	55/-
Pye "A" Deferred	5/-	14/6		12½	12½	4 6 3	14/6	10/-
Reyrolle	£1	80/-		17½	17½	4 7 6	84/6	73/6
Rheostatic	4/-	7/-		12½	12½	7 2 9	8/-	6/-
Richardsons Westgarth	10/-	14/6		16¾	8½*	5 15 0	15/-	13/-
Scottish Cables	4/-	10/9		27½	27½	5 19 0*	10/9	7/-
Simon-Carves	5/-	28/3	−6d	20	25	4 8 6	28/9	22/6
Smith (England), S.	4/-	10/-		17½	20	4 0 0*	10/-	7/-
Southern Areas	£1	11/3	+6d	7½	Nil	Nil	13/9	9/3
Strand Elec.	5/-	6/6	+9d	15	15	11 10 9	6/6	4/9
Sturtevant	5/-	15/3		15†	15†	4 18 3†	18/-	14/9
Sun Elec.	£1	51/3		25	25	9 16 3	51/3	47/3
Switchgear & Cowans	5/-	14/6		25	22½	7 16 3	14/6	8/9
Taylor Tunnicliff	5/-	14/6	+3d	15	17½	6 0 9	14/6	11/9
T.C.C.	10/-	32/6		25	25	7 13 9	38/6	32/6
T.C. & M.	£1	25/-	+6d	8½	8½‡	6 16 0	27/-	20/-
Telephone Mfg.	5/-	4/9	−3d	10	10	10 10 6	5/3	4/6
Telephone Rentals	5/-	12/6	−1/-	12½	12½	5 0 0	13/6	9/9
Thompson (John)	5/-	25/-		25	25	5 0 0	27/-	23/-
Thorn Elec. "A"	5/-	20/-		17½	17½	4 7 6	23/3	17/-
Thornycroft	£1	25/9	+9d	12½	12½	9 14 3	27/9	21/-
Tube Investments	£1	58/-	−3d	13½	15	5 3 6	58/3	48/3
Vactric	5/-	23/-	−1/-	25	25	5 8 9	24/9	14/3
Veritys	5/-	5/3		12½	2½	2 7 6	6/9	5/3
Walsall Conduits	4/-	15/3		20	22½	5 18 0	15/3	11/-
Ward & Goldstone	5/-	30/-	+1/-	40	25*	4 3 3	30/-	23/6
Watford	2/-	6/6		25	25	6 3 0*	7/6	5/-
Westinghouse	£1	38/9	+9d	18	10*	5 3 3	40/-	32/3
West, Allen	5/-	12/9	+6d	15	12½*	4 18 0	12/9	9/3
Wolf Electric	5/-	8/3		20	10*	6 1 3	9/-	6/9

British Relay Wireless

In his review accompanying the 1957–58 report of British Relay Wireless and Television, Sir Robert Renwick speaks of a feeling of real optimism about the continued growth of the business. Having recently replenished the cash resources by about a million, the company is in a position to plan ahead with more freedom than has been possible for some time past. Shareholders are reminded that development involves heavier depreciation charges and needs time to produce its effect upon earnings, for which reasons there may be a small reduction in the net profits of the current year. He expects the dividend to be maintained, however, at 20 per cent on this year's increased capital. On that rate, the yield from the 5s "A" shares of the company at a price of 21s 3d amounts to 4¾ per cent.

Company News

Disappointments in some of the recent company news were reflected in the prices of shares concerned. An announcement from Johnson & Phillips of the termination of discussions with W. T. Henley's Telegraph Works on the subject of a possible merger of the two firms was followed by a recession in the shares of the former company from 18s 9d to 16s 3d, and in those of W. T. Henley's Telegraph Works from 12s 6d and 12s.

A. C. Cossor have been marked down officially to 4s 6d (the market quotation was a few pence higher) since the decision to pay no dividend for the year ended last March, the trading result being a group loss of £14,000. For 1956–57 there had been a profit of £190,000, and a dividend of 2½ per cent. From the directors' preliminary statement, it appears that an unfavourable experience in radio and television business more than offset the better profits earned by the group's other activities.

East African Power

After a long sequence of 7 per cent dividends, on capital increased by periodical new issues, the East African Power & Lighting Company has raised the rate by a half per cent in each of the past two years. The shares have been appropriately firm, and at 21s they are now showing a yield of a little over 7½ per cent on the basis of the 8 per cent dividend distribution. During the course of last year, there was a marked increase in sales, and with new tariffs in operation for the last part of the period, the working surplus improved by some 17 per cent to £1¾ million. According to the chairman, there has been a definite easing of the rate of expansion since the war, but commitments outstanding for further capital expenditure exceeded £1 million at the end of last year.

REPORTS and DIVIDENDS

The Sterling Cable Co., Ltd., reports that the consolidated net profit of the company and its subsidiaries for 1957-58, after meeting all charges but before providing for taxation, was £105,606, against £110,409 for 1956-57. Taxation requires £56,963. The ordinary dividend is maintained at 10 per cent by a final distribution of 2½ per cent and again a 5 per cent bonus is being paid. A total of £106,005 (against £88,304) is carried forward.

In his address, circulated in advance of the meeting on 23rd September, the chairman and managing director (Mr. J. S. Clark) says that although the quantity of cable made and sold was greater the sales value was lower by reason of the decline in raw material prices and intense competition. Mr. Clark refers to the growing use of synthetic in place of natural rubber for insulation and protection and he hopes that United Kingdom producers will increase their output to a point at which this country will cease to be dependent upon the United States for the supply of synthetic rubber.

The order book is highly satisfactory and varied. The company is justly proud of the proportion of its output which is exported, particularly to the dollar area, and every possible step is being taken to maintain this high level.

During the year the company purchased the whole share capital of Floyd & Partners (Cables), Ltd., of Weston-super-Mare; the plant has been modernised and the enterprise is now working on a profit-making basis.

Simms Motor & Electronics Corporation, Ltd.—Particulars have been issued of the company's £750,000 6 per cent debenture stock, 1978-83. With the consent of the Capital Issues Committee, the stock is being issued as to £241,685 to acquire the 241,685 5 per cent £1 redeemable cumulative preference shares of M.E.C. Holdings, thereby making that company a wholly-owned subsidiary. Over 97 per cent acceptance has so far been obtained. The balance of £508,315 is being placed by Joseph Sebag & Co., at 99½, subject to a commission of ¼ per cent. The new money will be used to expand research facilities, for plant and machinery and working capital.

Parmiter, Hope & Sugden, Ltd.—The annual meeting was held on 27th August, Mr. E. W. Sugden (chairman and joint managing director) presiding. In the course of his speech, the chairman said that so far as the parent company was concerned the improvement in turnover experienced last year had been maintained during the year under review and, in fact, exceeded by a small amount. This had been offset, however, by a marked reduction in the turnover of the subsidiary, which led to an overall decline of about 5 per cent. The parent company experienced the decreased ordering rate referred to last year, and which had continued, although latterly with some degree of improvement. Despite this fact the profit, before tax, increased by a little less than 3½ per cent. The main factors in achieving this result included a general advance of 5 per cent in the prices of products, the existence at the commencement of the year of unusually high stocks of finished parts, and the fact that a high rate of output was maintained despite the reduced ordering rate.

George H. Scholes & Co., Ltd., report a net profit for the year ended 30th June last of £117,907, as compared with £100,510 for the preceding year. Taxation charged is £136,328. It is proposed to pay a final dividend of 14 per cent and a bonus of 5 per cent, making 25 per cent for the year on capital increased by a two-for-five scrip issue. A similar dividend was paid for the previous year on the smaller capital.

Merger Talks Discontinued.—The boards of W. T. Henley's Telegraph Works Co., Ltd., and of Johnson & Phillips, Ltd., announce that the talks which have been taking place with a view to a possible merger of their businesses have now been discontinued.

The Palestine Electric Corporation, Ltd., reports a profit for the year to 31st March last of I£1,462,785, as compared with I£78,460 for the preceding year. It is proposed to pay a dividend for the year of 4 per cent (against nil) on the ordinary stock and shares and the "A" ordinary stock.

International Combustion (Holdings), Ltd., has declared an interim ordinary dividend of 7½ per cent (unchanged).

John Thompson, Ltd., has declared an interim ordinary dividend of 10 per cent (same).

Increases of Capital

Square D, Ltd.—Increased by £75,000 in 38,250 "A" ordinary and 36,750 "B" ordinary shares of £1 each, beyond the registered capital of £200,000.

Modern Electrical Industries, Ltd.—Increased by £30,000 in 25,000 6 per cent cum. preference shares and 5,000 unclassified shares of £1 each, beyond the registered capital of £5,000.

Watford Electric & Manufacturing Co., Ltd.—Increased by £150,000, in 150,000 6% cumulative preference shares of 10s and 750,000 ordinary shares of 2s, beyond the registered capital of £50,000.

New Companies

A.E.I.-Gala, Ltd.—Registered 28th August. Capital £1,000. To acquire and hold any shares, stocks, bonds and securities or other investments; and to carry on the business of electrical, mechanical, chemical, heating, electronic and nuclear engineers, and producers and suppliers of electric, thermal, nuclear and other forms of power and light for all purposes, etc. Solicitor: C. Bodington, Crown House, Aldwych, London, W.C.2.

Granta Electrical, Ltd.—Registered 8th July. Capital £2,000. Electrical, mechanical, radio, television, telephone, lighting, heating, motor and general engineers, etc. Directors: J. E. Denley, Constance M. Denley and R. J. L. Checkley. Regd. office: 212, Mill Road, Cambridge.

K. & K. Electronics, Ltd.—Registered 8th July. Capital £5,000. Importers, exporters, manufacturers of and dealers in electronic instruments, etc. Directors: M. Kaplan, P. Kaplan and Mrs. Yelta Kaplan. Regd. office: 39, Roman Road, E.2.

Martin & Wilding, Ltd.—Registered 16th July. Capital £1,000. Electrical engineers, etc. Directors: H. Wilding and W. Martin. Regd. office: Coronation Buildings, 14/16, South Castle Street, Liverpool, 2.

Brierley and Price, Ltd.—Registered 21st July. Capital £3,000. Electrical, radio and television engineers, etc. Directors: G. A. Brierley and G. D. Price. Regd. office: 86-88, Stockwell Road, Handsworth, Birmingham.

H. L. Brown, Ltd.—Registered 21st July. Capital £1,000. Radio and electrical engineers, etc. Directors: H. L. Brown and Kathleen H. Brown. Regd. office: 90, Edgbaston Road, Smethwick, 41, Staffs.

Engineering & Electric Co. (Venezuela), Ltd.—Registered 21st July. Capital £100,000. Designing, making, building or manufacturing welded pressure vessels from steel and/or any other metals, and mechanical, consulting, civil, constructional and electrical and general engineers, etc. Regd. office: 18, Austin Friars, E.C.2.

Sleepwarm Electric Blanket Co., Ltd.—Registered 18th July. Capital £1,000. Manufacturers of and dealers in electric blankets, radio, television and electronic equipment of all kinds, etc. Directors: G. A. Edwards and Mrs. Marjorie P. Edwards. Regd. office: Padgate Works, off Elizabeth Drive, Padgate, Warrington.

Balais Cleaner Co., Ltd.—Registered 18th July. Capital £5,000. Manufacturers, importers and exporters of and dealers in domestic electrical appliances and domestic kitchen and household machines, etc. Directors: J. E. Cullimore, J. L. P. Charpin and Lt.-Comdr. A. E. Cullimore, R.N. (retd.). Regd. office: 23, Knightsbridge, S.W.1.

Tele-South Coast, Ltd.—Registered 18th August. Capital £100. Electricians, electrical contractors, electrical and mechanical engineers, television and radio engineers, etc. Directors: R. E. T. Nichols and G. S. Hibbs. Regd. office: 79, Grosvenor Street, W.1.

Pearsons (Housemade), Ltd.—Registered 19th August. Capital £1,000. Domestic electrical appliance dealers, sound acoustic engineers, electrical engineers and general electrical installation contractors, radio and television engineers, etc. Directors: J. R. Eaton and E. Pearson. Regd. office: Somercotes Hill, Somercotes, Derbyshire.

S.E. Laboratories (Developments), Ltd.—Registered 22nd August. Capital £100. Electrical and electronic engineers, etc. Directors: P. Newman and J. M. Walker. Regd. office: 29/31, Euston Road, N.W.1.

Astoria Electrics, Ltd.—Registered 22nd August. Capital £200. Electrical, mechanical, radio, sound, television, lighting, electronic, heating, telephone and general engineers, etc. Directors: E. G. Thresher and Joyce M. Thresher. Regd. office: 830, Seven Sisters Road, N.15.

Liquidations

Broadwater Electrical & Radio, Ltd., retailers of television, radio and electrical appliances, 77, Portland Place, London, W.1. —Winding up voluntarily. Liquidators, Mr. N. B. Cork, 19, Eastcheap, London, E.C.3, and Mr. S. Winograd, 77, Portland Place, W.1, appointed 6th August. Particulars of claims to Mr. Cork by 11th October.

Crystalate, Ltd., holding company of companies engaged in the manufacture of plastic and electrical goods, Crystalate House, Mill

Lane, Tonbridge, Kent.—Winding up voluntarily by a members' winding-up for reconstruction purposes. Liquidator, Mr. G. H. Wagstaff, Finsbury Court, Finsbury Pavement, London, E.C.2, appointed 18th August.

Dymock Television, Ltd., retailers of television and electrical appliances, 266, Fulham Road, London, S.W.10.—Winding up voluntarily. Liquidator, Mr. K. R. Cork, 19, Eastcheap, London, E.C.3.

Bankruptcies

A. Sheridan, lately trading in partnership with another as S.M. Disposals, of 223, Richmond Road, Hackney, London, E.8, radio and electrical contractor.—Order made 18th July suspending discharge for one month until 18th August.

J. L. Wood, formerly carrying on business under the style of Star Electrical at 62, George Street, Manchester, electrical engineer and contractor.—Receiving order made 19th August on debtor's own petition. Public examination 24th October at the Court House, Quay Street, Manchester, 3.

W. Worboys, 3, Lyefield Road East, Charlton Kings, Cheltenham, formerly carrying on business under the style of Cambrian Electrical Services at Longford Garage, Tewkesbury Road, Longford, Glos., as an electrical contractor.—Receiving order made 19th August on debtor's own petition. Public examination 23rd October, at the Court House, County Court Road, Cheltenham.

J. V. Lythgoe and **T. O'Brien**, carrying on business in co-partnership formerly at 385, Cheetham Street, Rochdale, under the style of Swift Clean Vac Shop, electrical appliance dealers.—Trustee, Mr. J. A. Freeman, 8, Manchester Road, Bury, Lancs., appointed 20th August.

J. Summerly, 93, Mowbray Road, South Shields, electrician.—Discharge granted and suspended for six months by order dated 1st August.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (3s 6d each including postage) are obtainable from the Patent Office, 25, Southampton Buildings, London, W.C.2

1953

35886/8. Plessey Co., Ltd.—Electrical apparatus involving plug and socket type connectors. 23rd December, 1954. (800991/3.)

1954

22305. English Electric Co., Ltd.—Manufacture of ceramic articles. 29th July, 1955. (800855.)

27864. Mallory Batteries, Ltd., and Parkinson, N.—Alkaline dry electric cells. 27th September, 1955. (801029.)

36033. Sylvania Electric Products, Inc.—Method of applying films by deposition *in vacuo*, and electrical impedances when made by the method. 13th December, 1954. (801030.)

1955

1896. Philips Electrical Industries, Ltd.—Electron beam tubes for stabilising high voltages. 21st January, 1955. (801038.)

2192. Perfection Bedding Co., Ltd.—Electrically heated mattresses. 25th April, 1956. (800936.)

2199. Ugon, P. E.—Electromagnetic devices. 25th January, 1955. (801051.)

11139. Metropolitan-Vickers Electrical Co., Ltd.—Control of electrical heating apparatus. 18th April, 1956. (800938.)

11394. Electric & Musical Industries, Ltd.—Terminations or attenuators for waveguides. 6th April, 1956. (800859.)

16504. Farbenfabriken Bayer Akt.-Ges.—Electrical insulating materials composed of high molecular weight polycarbonates. 8th June, 1955. (800815.)

18392. Electricité de France.—Apparatus for recording values relating to a physical variable. 24th June, 1955. (800816.)

18439. National Research Development Corporation.—Electrical multi-state circuits. 25th June, 1956. (Cognate application 30956, 28th October, 1955.) (800817.)

20875. Brennan, J. B.—Electrodes for electric storage batteries. 19th July, 1955. (800734.)

20988. Concordia Electric Safety Lamp Co., Ltd., and Steadman, C. H.—Portable electric lamps especially for miners. 13th September, 1956. (800715.)

23746. Hunt (Capacitors), Ltd., A. H.—Terminals for electrical capacitors and like electrical components housed in cans. 15th August, 1956. (Cognate application 35021, 6th December, 1955.) (800940.)

28495. Communications Patents, Ltd.—Apparatus for generating electric power. 4th January, 1957. (800821.)

31550. Rotax, Ltd.—Excitation means for alternating electric current generators. 29th January, 1957. (800742.)

33273. Soc. Française Radio-Electrique.—Oxide-coated cathodes for thermionic tubes. 21st November, 1955. (800919.)

33466. Muirhead & Co., Ltd.—Method and apparatus for receiving picture telegraph signals transmitted by radio. 14th November, 1956. (800874.)

33496. Decca Record Co., Ltd.—Radar apparatus. 22nd November, 1956. (800920.)

36186. Metamec, Ltd.—Means of controlling the direction of rotation of synchronous electric motors. 14th November, 1956. (800743.)

37496. General Electric Co., Ltd., Head, N. E., and Ingram, D. G. W.—Modulating and demodulating apparatus for use in duplex electric carrier systems. 18th December, 1956. (800878.)

1956

920. Walsall Conduits, Ltd.—Electric plug connectors. 3rd January, 1957. (801052.)

1221. Marconi's Wireless Telegraph Co., Ltd.—Noise suppressing circuits for radio receiving and other signal channels. 8th October, 1956. (800784.)

9581. Engelhard Industries, Inc.—Potentiometers. 27th March, 1956. (801034.)

11033. General Electric Co.—Protecting systems for electric power transmission lines. 11th April, 1956. (801008.)

12315. Nettle Accessories, Ltd., and Revington, D.—Electric lampholders. 11th April, 1957. (801055.)

12696. Mullard Radio Valve Co., Ltd.—Waveguide isolators. 24th October, 1956. (800800.)

13684. Compagnie Générale de Télégraphie sans Fil.—Frequency separating arrangements. 3rd May, 1956. (800923.)

15963. General Electric Co.—Voltage mixing and transfer circuits. 23rd May, 1956. (801009.)

16526. Officine Meccaniche Riunite Soc. per Azioni:—Controllers for electrically driven cranes or the like. 29th May, 1956. (800753.)

16970. Sperry Rand Corporation.—Adding circuits and logical circuits therefor. 1st June, 1956. (800834.)

18957. Fraser, H., and Cantlay, W. G.—Means for connecting overhead high tension electrical cables to the insulators of transmission towers. 13th December, 1956. (800980.)

19427. General Electric Co.—Electric heating elements of the tubular sheathed type. 22nd June, 1956. (801057.)

21250. Elektriska Svetsningsaktiebolaget.—Manufacture of coated electrodes for electric arc welding. 9th July, 1956. (800755.)

22410. Philips Electrical Industries, Ltd.—Non-reciprocal high-frequency transmission systems. 19th July, 1956. (800892.)

22763. Compagnie des Machines Bull.—Electric contact device for actuation by the tabulating movement of a carriage of a typewriting, tape punching or accounting machine. 23rd July, 1956. (800804.)

31197. General Electric Co.—Mounting means for turbine blades. 12th October, 1956. (800839.)

31747. Ateliers des Lampes de Genevilliers.—Method of shaping a coiled rectilinear incandescent electric lamp filament. 18th October, 1956. (800929.)

35881. Standard Telephones & Cables, Ltd.—Clutch for switch machines. 23rd November, 1956. (801048.)

1957

638. General Cable Corporation.—Self-supporting aerial telephone cable. 7th January, 1957. (800903.)

16094. General Electric Co.—High strength alloy. 21st May, 1957. (800989.)

16745. Neidig, A., Neidig, W., Neidig, W., Neidig, H., and Neidig, W. (trading as Neidig Söhne Maschinenfabrik, F. A.).—Magnetic filters. 24th June, 1955. (Divided out of 801003.) (801004.)

TRADE MARKS

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered up to 13th September:—

GALA. No. 776,472. Class 7. Electric machines for domestic use and parts.—Hotpoint Electric Appliance Co., Ltd., Crown House, Aldwych, London, W.C.2.

ROLLECTRIC. No. 760,658. Class 8. Electric shaving apparatus and parts.—Sperry Rand Corporation, New York, U.S.A. Address for service, c/o F. J. Cleveland & Co., 29, Southampton Buildings, Chancery Lane, London, W.C.2.

FANAL (design). No. 774,371. Class 9. Scientific and electrical apparatus and instruments; nautical and surveying apparatus and instruments; radio sets (complete), etc.—Metzenauer & Jung G.m.b.H., Wuppertal-Elberfeld, Germany. Address for service, c/o Haseltine, Lake & Co., 28, Southampton Buildings, Chancery Lane, London, W.C.2.

MY DAY. No. B764,698. Class 11. Electric torches.—Motokov, Podnik Zahranicniho Obchodu, Prague, Czechoslovakia. Address for service, c/o Reddie & Grose, 6, Bream's Buildings, London, E.C.4.

No. 775,492 (design). Class 11. Electric lamps.—British Luma Co-operative Electric Lamp Society, Ltd., 95, Morrison Street, Glasgow, C.5.

SIELETTE. No. 776,795. Class 11. Lamp shades, lamp reflectors and fittings.—Siemens Edison Swan, Ltd., Caxton House, Tothill Street, Westminster, London, S.W.1.

GENERATION and DEVELOPMENT

Richborough Generating Station

The Central Electricity Generating Board has received the consent of the Minister of Power to the establishment of a new power station at Richborough, Kent. The total capacity of the station will be 360 MW, the plant consisting of three 120 MW turbo-generator sets with three reheat boilers each with an evaporative capacity of 860,000 lb/hr. Steam conditions will be 1,500 lb/sq in at 1,000 deg F with reheat to the same temperature. The first generating set is scheduled for commissioning in 1962.

Power Station Contracts

Contracts have been placed by the Central Electricity Generating Board during the past month for power station equipment amounting approximately to £2,362,000. They include the following:—

Belvedere power station, near Erith, Kent: Booster and boiler feed pumps. —G. & J. Weir.

Drakelow "B," Burton-on-Trent: 3,300 V and 415 V works auxiliary switchgear.—A. Reyrolle & Co. H.p. pipework and valves for Nos. 5 and 6 units.—Stewarts & Lloyds.

Willington "A," near Derby: Capital spares for turbo-generators 1-4.—English Electric Co.

Aberthaw: Six boiler feed pumps and six booster pumps with ancillary equipment.—G. & J. Weir. 415 V switchgear and accessories.—English Electric Co.

Thorpe Marsh: Access road.—Tarslag.

Brake on Rural Development

The *Western Morning News* reports that Mr. A. N. Irens, chairman of the South Western Electricity Board, has written to Mr. Marshall, M.P. for Bodmin, saying that because of a reduction in the amount of capital available electrification of the rural areas in the south-west is being slowed down. Mr. Irens refers to the pressing need to reinforce parts of the distribution system—"a need which we cannot afford to neglect."

Glasgow "All-Electric" Flats

Glasgow Corporation Housing Committee has approved in principle a scheme for building blocks of flats of 19 storeys, rising 180ft and standing on "stilts" above the ground, in the Gorbals area of the city. Four hundred houses will provide accommodation for 1,280 persons, and ten towers will be linked in two groups. It is intended that the blocks will be all-electric with underfloor heating in living-rooms and circulation areas. Access to the flats would be from three main staircase towers, each containing two lifts. At the base it is proposed to have shops, offices, public houses, restaurants, a post office, police station and possibly a cinema or assembly hall. The cost of the scheme is still under discussion.

Jersey Power Station Extension

Three new generating sets are being installed at the main generating station of the Jersey Electricity Co., Ltd., at St. Helier. When completed they will increase the installed capacity of the station from its present 19 MW to 26 MW. The new sets include a Harland & Wolff 3,300 kW 16-cylinder four-stroke diesel generating set. The company is also replacing two 400 kW generating sets with two 2,000 kW Mirrlees/Brush generating sets.

As a further part of its programme it is replacing its present switchboard with a new 33 panel 250 MVA, 6·6 kV switchboard, together with a remote control room. It is hoped to have the new generating plant in commission by the end of this year. The maximum demand on the company's plant and electricity sold have doubled in the last ten years.

OVERSEAS

Nigerian Development

At a cost of £400,000, the Northern Nigerian Government is to finance the installation of electricity supplies in seven of the larger towns in the region which are still without supplies. The work will be carried out and the undertakings operated by the Electricity Corporation of Nigeria, which will use its own resources to carry out an installation at another town; it has been asked to make surveys and prepare estimates for six more.

Distribution in Toronto

A landmark in the progress of electricity distribution in Toronto last year was the elimination of the remaining d.c. services in the city. At the same time, in the frequency standardisation programme, a greater number of consumers were changed over than in any previous year, while the expansion of underground construction reached a record high level. Gross capital expenditure, of $11·3 million, was consequently the highest in the history of the Hydro-Electric System.

At the end of 1957 the number of consumers supplied at 60 c/s was 122,405 (against 75,648 a year before) and their peak demand of 457,900 kW was equal to 82 per cent of the combined 25 and 60 c/s load. Expenditure on underground construction was 50 per cent more than in 1956. An interesting project was the installation of four 13·2 kV cables with aluminium conductors. The Commissioners observe that the use of aluminium rather than copper conductors proved to be the more economical plan. This installation was the first of its kind in Canada. Much of the underground work carried out will enable heavy overhead lines to be taken down at a later date.

Sales of electricity aggregated 2,818 million kWh, an increase of 3·9 per cent. Towards the end of the year the rate of expansion was rather below the average for the year, reflecting the change in general business conditions.

Kariba Progress

The first stage of the Kariba Dam hydro-electric scheme is reported by Barclays Bank D.C.O. "Overseas Review" to be some 70 per cent complete. This stage will bring the first power station generating 600 MW into use, and should be completed in 1960. Work has started on blocking the south bank diversion tunnel, and this will be followed by the blocking of the north bank diversion channel in October when the Zambesi will be completely contained by the dam. Major modifications made to the original plans for the dam allow for raising of the water level by a further 20ft with subsequent greatly increased potential, the addition of two extra floodgates and an increase in the size of the second power station, to be built. Further contracts worth £600,000 for the clearance of 60,700 acres of bush have been awarded.

The Bank reports that the supply of electricity to consumers in the Federation of Rhodesia and Nyasaland rose by 12 per cent to 3,166 million kWh during the year ended 30th June last. This included 693 million kWh imported from Le Marinel station (Belgian Congo) and 25 million kWh from Revue (Portuguese East Africa).

Ceylon's Hydro-Electric Scheme

Our Colombo correspondent reports that negotiations for a World Bank loan for the next phase of Ceylon's hydro-electric scheme (Stage IIB) have been deferred pending a decision whether a public corporation should replace the Department of Government Electrical Undertakings. The World Bank, it is stated, has insisted on a public corporation. The Government had decided to call world-wide tenders for Stage IIB of the scheme at the beginning of next year.

Mr. J. G. Park, electrical engineering adviser to the Ceylon Government, recently recommended the setting up of a central electrical authority for the generation, transmission and distribution of electricity in the whole island, responsible to the Minister of Transport and Works and through him to Parliament.

Expansion in Jamaica

It is reported from Kingston that the Jamaica Public Service Corporation proposes to embark upon an electricity supply expansion programme up to 1963. The cost is said to be over £7 million.

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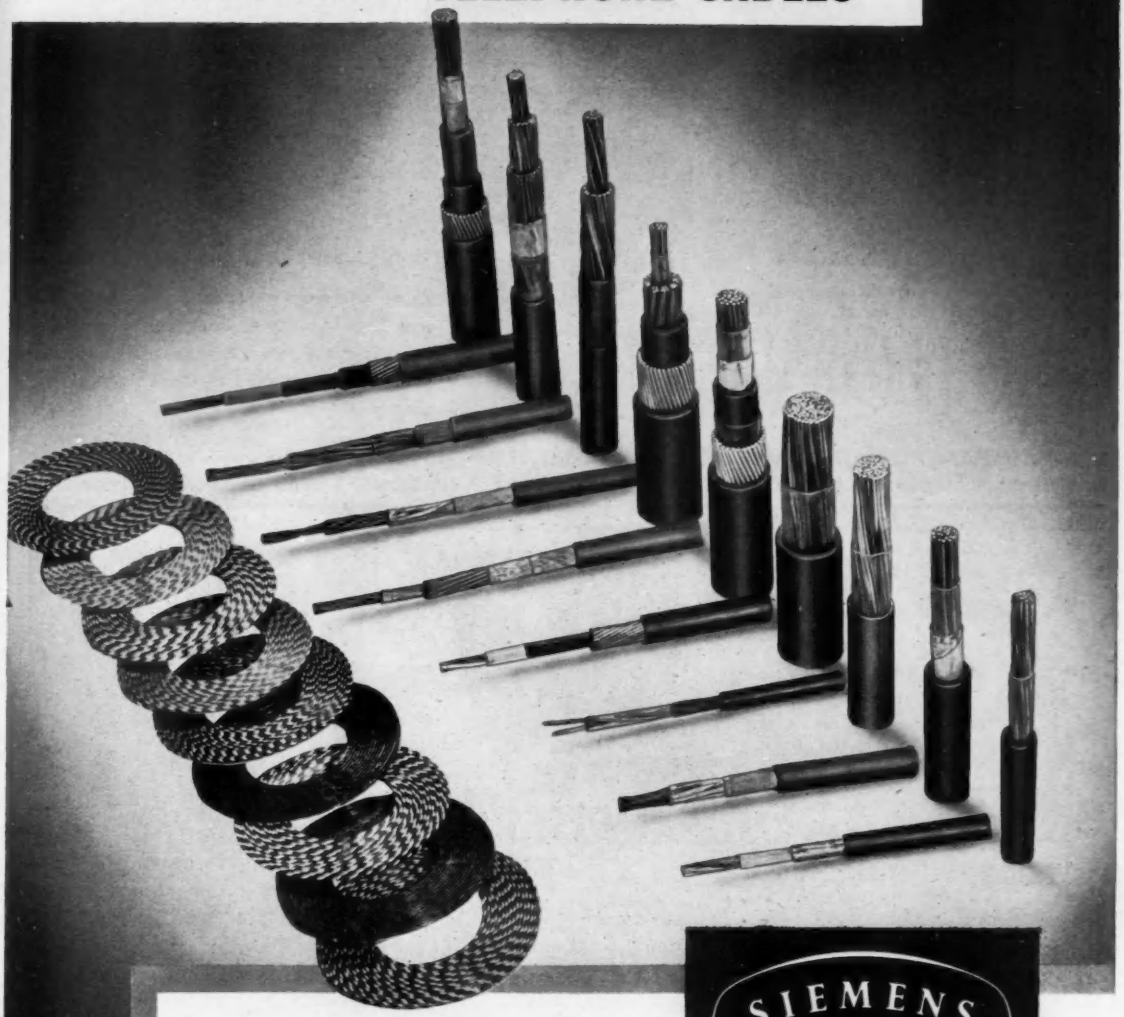

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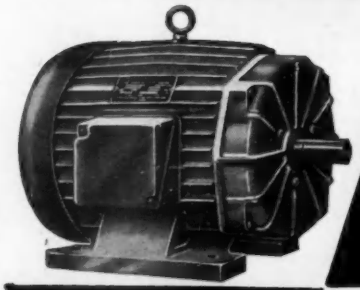

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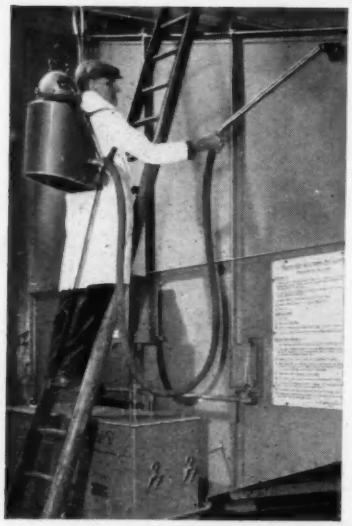

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CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses

Australia.—State Electricity Commission of Queensland, Brisbane. 29th October. One 15 MW turbo-alternator set. (E.S.B. 20865/58. Ten/34202.)*

Burma.—Burma Purchase Board, Rangoon. 18th September. H.t. batteries. (E.S.B. 21484/58. Ten/34311.)*

Canada.—City of Winnipeg Hydro-Electric System. 10th September. Weatherproof copper cable. (E.S.B. 21636/58. Ten/34327.)*

Ceylon.—Tender Board, Ministry of Transport and Works, Colombo. 24th September. A.c.s.r. conductor and steel earth conductor. (E.S.B. 21335/58. Ten/34298.)*

Chile.—Departmento de Materiales y Almacenes, Santiago. 26th September. Electric cable and wire. (E.S.B. 20647/58. Ten/34184.)*

Formosa.—Central Trust of China. 24th September. Telephone equipment. (E.S.B. 21233/58.I.C.A. Ten/34308.)*

Havant and Waterloo.—U.D.C. 15th September. Street lighting equipment. (See this issue.)

India.—Director General of Supplies and Disposals, New Delhi. 16th September. Aluminium and a.c.s.r. conductors and accessories. (E.S.B. 21507/58. Ten/34318.)* Telecommunication cables. (E.S.B. 20692/58. Ten/34175.)* 18th September. Airport cable and jointing materials. (E.S.B. 21508/58. Ten/34321.)*

Madras Port Trust. 13th October. H.v. and l.v. substation switchgear. (E.S.B. 21375/58. Ten/34300.)*

Iran.—Plan Organisation, Teheran. 28th September. Electrification of the towns of Targhabeh and Fariman. (E.S.B. 21112/58. Ten/34259.)*

Kidsgrove.—U.D.C. 17th September. Street lighting installation. Specifications from the surveyor, Town Hall, Kidsgrove, Staffs.

Kuwait.—10th November. Overhead and underground cables. 12th November. Power stations; air-conditioning equipment. 15th November. Automatic exchange and radio equipment. (E.S.B. 9436/58. Ten/32020B.)*

Lebanon.—Ministry of Public Works and Communications, Beirut. 23rd September. Electric insulator assemblies. (E.S.B. 20797/58.I.C.A. Ten/34213.)*

London.—India Store Department. 13th October. H.v. and l.v. switchgear for Madras Port Trust. (See this issue.) 29th September. Electric welding plant. (See this issue.)

New Zealand.—Dunedin Electricity Department. 17th September. Fuse switch units. (E.S.B. 21155/58. Ten/34279.)* 10th October. Transmission line towers and conductor. (E.S.B. 21006/58. Ten/34214.)* 27th October. 33 kV and pilot cable. (E.S.B. 21156/58. Ten/34278.)*

G.P.O., Wellington. 2nd October. Microammeters, milliameters and voltmeters. (E.S.B. 21224/58. Ten/34280.)*

State Hydro-Electric Department, Wellington. 25th November. Air break switches. (E.S.B. 21213/58. Ten/34281.)*

North Kesteven.—R.D.C. 1st October. Pumping plant. John H. Haiste & Partners, consulting engineers, Belmont House, 20, Wood Lane, Headingley, Leeds, 6.

Old Fletton.—U.D.C. 30th September. Sodium street lighting installation to group "A" standard. (See this issue.)

Pakistan.—Director General, Supply and Development, Karachi. 30th September. Electric drills, electric arc welding machines, etc. (E.S.B. 20864/58.I.C.A. Ten/34182.)*

Portuguese East Africa.—Permanent Purchasing Commission, Lourenço Marques. 27th September. Radio receivers for meteorological department. (E.S.B. 20971/58. Ten/34220.)*

Rhodesia and Nyasaland.—Bulawayo Electricity Department. 17th September. Tubular steel transmission line poles. (E.S.B. 20956/58. Ten/34215.)*

Federal Tender Board, Causeway. 19th September. Active and inert carrier telephone systems. (E.S.B. 20899/58. Ten/34293.)*

Umtala Electricity Department. 24th September. Distribution boards. (E.S.B. 21237/58. Ten/34301.)*

Runcorn.—R.D.C. 22nd September. Fluorescent lighting installation for A.49 road. Surveyor, Castle Park, Frodsham, via Warrington.

St. Albans.—Corporation. 23rd September. Erection and wiring of street lighting equipment. (See this issue.)

South Africa.—Durban Electricity Department. 12th September. High voltage Schering bridge testing equipment. (E.S.B. 20599/58. Ten/34169.)*

Union Tender and Supplies Board, Pretoria. 18th September. Oscillator and tuned detector amplifier. (E.S.B. 20992/58. Ten/34239.)* Rectifiers. (E.S.B. 20991/58. Ten/34209.)* Electric hoists and runway trolleys. (E.S.B. 20987/58. Ten/34225.)* 2nd October. Electric furnace. (E.S.B. 20985/58. Ten/34226.)* 16th October. Telephone switchboards. (E.S.B. 20990/58. Ten/34267.)*

Stores Department, South African Railways, Johannesburg. 19th September. Tie rods and coils for reactors. (E.S.B. 20689/58. Ten/34170.)* 26th September. Switchgear and transformers. (E.S.B. 21191/58. Ten/34246.)* 1st October. 150 MVA switchboard and two 200 kVA transformers. (E.S.B. 21193/58. Ten/34271.)*

Johannesburg City Council. 11th September. Portable radio telephone sets. (E.S.B. 21262/58. Ten/34291.)*

South West Africa.—Windhoek Municipality. 8th October. Coal handling, storing and reclaiming plant for power station. (E.S.B. 21122/58. Ten/34238.)*

* Specifications may be inspected at the Export Services Branch, Board of Trade, Lacon House, Theobald's Road, London, W.C.1 (Chancery 4411; extension 769).

ORDERS PLACED

Durham.—County Council. Alterations and additions to the electrical installation at Framwellgate Moor central repair depot (£1,383).—Rashleigh, Phipps & Co.

Hartlepool.—Corporation. Electrical installations in 26 houses and five shops and flats (£1,399).—J. Westmorland & Co.

London.—L.C.C. Accepted. Two electric passenger lifts and two electric meals service lifts for installation in Stockwell County Secondary School, Lambeth (£14,123).—Elliston, Evans & Jackson.

London Transport. Accepted. Alterations to the electrical installation at Golders Green Underground depot (£22,500).—Rashleigh, Phipps & Co.

Newcastle-on-Tyne. — Regional Hospital Board. Electrical installation in wards 3 and 4 at St. Nicholas Hospital (£2,576).—Veale & Nixon. Electrical installation work at Winterton Hospital (£1,854).—T. Mitchelson (Electrical).

South Shields.—Education Committee. Electrical installation in the Whiteleas Infants' School (£2,421).—Ramsay & Son

Watford. — Housing Committee. Recommended. Electrical installations in 84 houses on the Meriden estate (£2,795).—J. F. Hillman, Ltd.

WORK IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors

Ashington.—Miners' Institute (£32,000); J. G. Green & Sons, builders, Warkworth, Northumberland.

Ashton under Lyne.—Factory, Cavendish Street and Dean Street; Richard Whiffen, Ltd., Wellington Road.

Bangor.—Erection of shops, etc., in connection with redevelopment of Town Centre; borough engineer.

Barrow-in-Furness. — Rebuilding public baths, Abbey Road; Wadham & Parker, architects, Duke Street, Barrow.

Bath.—Erection of shops and luxury flats on site of Grand Pump Room Hotel (to be demolished); Ravenseft Properties, Ltd., 52, Charles Street, London, W.1.

Beddington and Wallington.—Houses (134) as redevelopment scheme, Richmond Road; borough engineer, Town Hall, Wallington, Surrey.

Bidston.—Houses (87), Poole Lane; Lloyd & Cross, Ltd., Port Causeway, Bromborough.

Billingham-on-Tees.—Houses (82) and ten bungalows; Moore & Cartwright, Ltd., builders, High Street, Norton.

Birkenhead.—Block of municipal offices, Argyle Street/Cleveland Street corner site (£100,000); borough architect, 3, Conway Street.

Birmingham. — Dwellings (70), King's Heath; J. & P. Kelly, 595, Stratford Road, Sparkbrook.

Chemistry block for University; Wilson, Lovatt & Sons, Ltd., builders, Clarence Street, Wolverhampton.

Boston.—College of further education proposed on site off Rowley Road, for Holland C.C.; county architect, County Hall, Boston, Lincs.

Bridgnorth.—Shops and offices, Moat Street; Geo. Linnecor & Sons, Ltd., New Town Row, Birmingham, 6.

Brighton.—72 flats, Whitehawk estate; G. T. Crouch, Ltd., builders, Sutherland House, Surbiton Crescent, Kingston-on-Thames.

Bristol.—Warehouse, offices and showrooms, Little Queen Street; F. C. Jones & Howard H. Gealy, architects, 67, Queen Street, Cardiff.

Bromsgrove.—Houses (124), Rock Hill estate No. 1; Crump and Aplin, quantity surveyors, National Provincial Bank Chambers, High Street.

Caithness.—Houses (68) on ten sites; W. Wilson, architect, County Offices, Wick.

Cannock.—Houses (64), Littlewood Lane site, Cheslyn Hay; John P. Roberts, clerk to R.D.C., Council Offices, Penkridge, Stafford.

Cheadle.—Technical and grammar school (£100,000); director of education, Green Hall, Lichfield Road, Stafford.

Chelmsford.—Houses (292), Moulsham

Lodge estate; Roxwell Development Co., Ltd., 123, South Street, Romford.

Cranfield.—Extension at College of Aeronautics; Stillman & Eastwick-Field, architects, 30, John Street, W.C.1.

Dagenham.—New process plant; May & Baker, Ltd., Rainham Road.

Extensions to Kingswood Secondary School; Gray, Conoley & Co., Ltd., builders, 29, Stephenson Street, E.16.

East Ham.—Flats at Melford Road (140), and at Lonsdale Avenue (110); chief housing officer, Town Hall, E.6.

Fashion Stores, High Street; C. & A. Modes, Ltd., North Row, Oxford Street, London, W.1.

Egremont (Cumberland).—R.C. church; J. & W. Robson, builders, Church Road, Whitehaven.

Exeter.—Shopping centre with dwellings over shops, Sidwell Street; city architect, Municipal Offices.

Gateshead.—Additions to Shipcote Grammar School for the E.C. (£159,000); Clerey & Son, builders, 14, Frederick Street, Sunderland.

Glasgow.—100-bed maternity hospital on site adjacent to Yorkhill Children's Hospital (£400,000); architect, West Regional Hospital Board (Scotland), West Regent Street.

Gosport.—Office block, North Street; Alan A. Briggs, architect, 10, Fleet Street, E.C.4.

Guildford.—Warehouse, offices, Aldershot Road; James Longley & Co., Ltd., builders, Joinery Works, Crawley.

Haddington.—Houses (203), Artillery Park; burgh surveyor, Council Offices.

Harlesden.—Fire station, Waxlow Road (£68,800), for Middlesex C.C.; C. G. Stillman, county architect, 1, Queen Anne's Gate Buildings, S.W.1.

Harrogate.—Houses (124), Bilton Lane and Kirkham Road; Wright & Robinson, builders, Knaresborough Road.

Hexham.—Additions to county modern school (£80,000); C. C. Brown, county architect, County Hall, Newcastle-on-Tyne.

Hornchurch.—Maisonnettes (52), Front Lane, Cranham; P. L. Cox, clerk, Council Offices.

Hyde.—Works extensions; Maiden & Co., Ltd., Alexandra Street.

Johnstone.—Houses (48), The Castle site; J. A. Bent, Scottish Special Housing Association, 15/21, Palmerston Place, Edinburgh, 12.

Keighley.—10-storey flats, Oakworth Road redevelopment; borough architect, College Street.

Kirkleatham (Yorks).—Proposed hospital for Newcastle Hospital Board, Benfield Road, Newcastle-on-Tyne; P. H. Knighton, Board's architect.

Leadenham.—Secondary school; Bosworth & Wakeford, Ltd., builders, New Street, Daventry.

Leeds.—Halls of residence, Weetwood, for University; Jones & Stocks, architects, 7, Blenheim Terrace.

Shops and offices in Eastgate, for National Deposit Friendly Society; secretary, 157, Woodhouse Lane.

Leicester.—First instalment of scheme for new Civic centre, Albion Hill area (£280,000); J. H. Lloyd Owen, city architect.

Lichfield.—Houses (60), on three sites; clerk, Rural Council House.

London.—Office block, Cannon Street and Bread Street; Wates, Ltd., 1258, London Road, Norbury, S.W.16.

Flats (68), Convent Gardens and St. Mark's Grove, Kensington; borough engineer.

Flats (48), St. Mary's estate, Shoreditch; Tersons, Ltd., builders, 4, Dollis Park, N.3.

Office block, Grosvenor Place, S.W.; Legal & General Assurance Co., Aldwych House, W.C.2.

Office block, Cheapside, Bread Street and Watling Street; E. C. Tersons, Ltd., builders, 4, Dollis Park, N.3.

Works extensions, Eastway, Hackney; British Oxygen Gases, Ltd., Spencer House, St. James's Place, S.W.1.

Dwellings (201), Canterbury Crescent, Lambeth; Harry Moncrieff, architect, 73b, South Side, Clapham Common, S.W.4.

Offices and showrooms, Old Compton Street; F. G. Minter, Ltd., builders, 4, Buckingham Gate, S.W.1.

Four-storey block of flats at Southmead Estate, Wandsworth; borough architect, Municipal Buildings, S.W.18.

Manchester.—Warehouse and distribution depot, Alexandra Road South; S.P.D., Ltd., Green Bank, Wapping, E.1.

Houses (222), Partington, Cheshire, Contract No. 256; director of housing, Town Hall, 2.

Reading.—Block of offices, Abbey Mill site, Abbey Square, for Berks. C.C.; county architect, Wilton House, Parkside Road.

Department of Physics for the University, Whitenights Park; Gilbert-Ash, Ltd., builders, 2, Stanhope Gate, Park Lane, W.1.

Rutland.—Primary schools at Casterton and Uppingham; county architect, Catmose, Oakham.

Swinton and Pendlebury.—Houses (64), and four blocks of flats, Beehive estate, Clifton; borough engineer, Town Hall.

Wakefield.—Extensions to Manygates Hospital, Barnsley Road (£150,000); Group secretary to "A" Group Hospital Management Committee, Clayton Hospital, Northgate.

West Bromwich.—Works, off Bagnall Lane; Iobic, Ltd., 34, Waterloo Street, Birmingham, 2.

Factory and offices, Roebuck Road; Attridge & Allen, 86, Cheshire Road, Birmingham, 41.

FORTHCOMING EVENTS

Organisers of electrical functions are advised to make use of the "Electrical Review" clearing house, Room 221, Dorset House, Stamford Street, London, S.E.1, to ascertain that proposed dates for their functions do not clash with others already arranged

Monday, 8th September

BOLTON.—Railway Hotel, Trinity Street, 7.45 p.m. A.S.E.E. Bolton Branch. "Display Lighting," by A. White.

LONDON.—Century Hotel, Forty Avenue, Wembley Park, 8.15 p.m. A.S.E.E. North West London Branch. Open meeting.

White Hall Hotel, Bloomsbury Square, W.C.1, 7.15 p.m. A.S.E.E. Central London Branch. "Artificial Satellites and the International Geophysical Year," by K. Ward.

Tuesday, 9th September

CARDIFF.—Angel Hotel, 7.30 p.m. A.S.E.E. South Wales Branch. "The Diesel Engine as a Power and Heating Unit," by P. Makin.

EDINBURGH.—25, Charlotte Square, 7 p.m. Incorporated Plant Engineers, Edinburgh Branch. Members' evening—talks by W. H. Bidgood and L. C. Sykes.

LONDON.—Connaught Rooms, 12.30 for 1 p.m. Electrical Industries Club luncheon. "A Peep Behind the Iron Curtain," by W. H. L. Lythgoe.

MANCHESTER. — Engineers' Club, Albert Square, 7.15 p.m. Incorporated Plant Engineers, Manchester Branch. Chairman's "At Home."

PORTSMOUTH—Ministry of Labour and National Service, Lake Road, 7.30 p.m. A.S.E.E. Portsmouth and District Branch. "Trinity House (Signalling and Lighting)," by J. W. Nichols.

READING.—Electricity Board Demonstration Room, Market Square, 7.15 p.m. A.S.E.E. Reading and District Branch. Inaugural branch meeting.

YORK.—Georgian House, Blossom Street, 7.30 p.m. A.S.E.E. York Branch. "Refrigeration," by A. J. Simpson.

Wednesday, 10th September

BIRMINGHAM.—Birmingham Exchange and Engineering Centre, Stephenson Place, 7.30 p.m. A.S.E.E. Birmingham Branch. "Navigational Aids," by C. Powell.

BRADFORD. — Midland Hotel, 7.30 p.m. A.S.E.E. Bradford Branch. "The Application of Temperature Controls," by A. P. Bellis.

BRISTOL.—Grand Hotel, Broad Street, 7.15 p.m. Incorporated Plant Engineers, Western Branch. "Smoke Abatement and the Clean Air Act."

DUNDEE.—Taypark Hotel, West Ferry, 7.30 p.m. Incorporated Plant Engineers, Dundee Branch. Film and talk, "Manufacture of Town's Gas."

GLASGOW. — 39, Elmbank Crescent. A.S.E.E. Glasgow Branch. "Basic Principles of Nuclear Power Stations," by A. L. Shaw.

LONDON.—Eltham Green School, Queenscroft Road, Eltham, S.E.9, 7.45 p.m. A.S.E.E. South East London Branch. Chairman's address, by G. H. Cook.

NORWICH.—The Assembly House, 7.30 p.m. Institution of Production Engineers, Eastern Region. "Material Control Progress and Machine Loading."

Thursday, 11th September

NEWCASTLE-UPON-TYNE.—Roadway House, Oxford Street, 7 p.m. Incorporated Plant Engineers, North East Branch. "Site Casting and Steam Curing of Prestressed Concrete Bridge Beams," by D. F. Lambkin.

WIMBLEDON. — Prince of Wales Hotel, 7.45 p.m. A.S.E.E. South West London Branch. "Plastics in the Electrical Industry," by H. Walker.

Friday, 12th September

LONDON.—Feathers Hotel, Broadway, Westminster, 6 p.m. Electrical Trades' Commercial Travellers' Association. General meeting. Talk: "Safety in the Home," by Col. S. J. Emerson.

Tuesday, 16th September, to Friday, 19th September

HARROGATE.—Association of Public Lighting Engineers. Annual conference.

Monday, 22nd September, to Friday, 26th September

BIRMINGHAM.—Institute of Metals. Golden Jubilee Autumn Meeting.

Monday, 22nd September, to Saturday, 27th September

MANCHESTER.—City Hall. National Business Efficiency Exhibition.

Tuesday, 23rd September

LONDON.—Caxton Hall. A.S.E.E. Electrical Engineers Exhibition. Ballot meeting.

Wednesday, 24th September, to Friday, 3rd October

LONDON.—Olympia. Industrial Fuel Efficiency Exhibition.

Thursday, 25th September

LONDON.—Connaught Rooms, W.C.2, 12.30 for 12.55 p.m. Batti-Wallahs' Society. Luncheon. Guest speaker W. Laver.

Friday, 26th September, to Saturday, 4th October

LONDON.—Earls Court. Commercial Motor Show.

Monday, 29th September

VIRGINIA WATER. — Wentworth Golf Course. Electrical Industries National Golf Championship finals, followed by the annual dinner (7.30 for 8.30 p.m.) at the Park Lane Hotel, Piccadilly, W.

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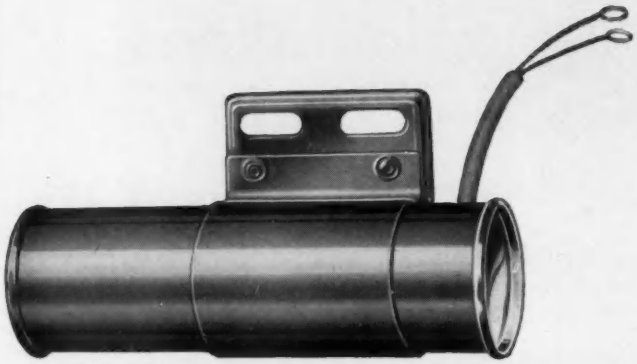

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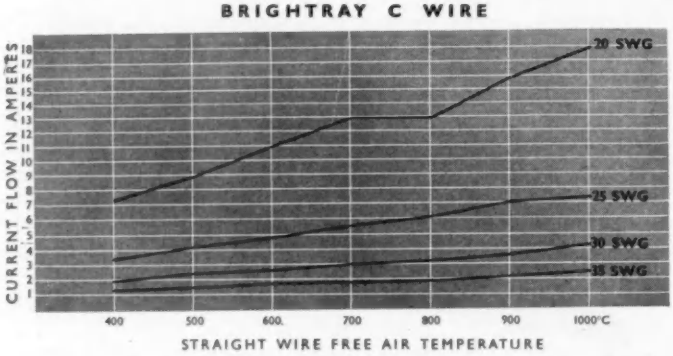
HOW TO SELECT THE BEST ELECTRICAL RESISTANCE ALLOY

Fundamental considerations in the design of electrical heating equipment

ELEMENT TEMPERATURE—A VITAL DESIGN CONSIDERATION In designing electric heating equipment, element temperature is naturally a primary consideration for upon it depends the efficiency and reliability of the equipment. An element's life will be shortened if it is allowed to operate above the safe working limit of the material while operation below the maximum will result in a considerable extension of element life.

FACTORS GOVERNING ELEMENT TEMPERATURE Element temperature depends on two factors (1) the surface area electrical loading (usually expressed as watts per sq. in. of resistor surface area) and (2) local heat dissipating conditions. While the first can be determined accurately for any piece of equipment, the second is subject to many influences such as type of mounting, dimensions of spiral, circulation of air around the element. It cannot easily be determined exactly. The rate at which heat can be dissipated or removed from the element governs the surface area electrical loading that can be allowed. Thus certain types of water heaters and space heaters using a forced draught may be loaded to a high watts density, while an enclosed oven element may have a low watts density.

TESTING ELEMENT MATERIALS As a basis for determining desirable element temperatures, and hence suitable electrical loading, a wire of the material to be tested is held horizontally in free air and used as a datum during the test. The result of this test is known as the ' straight wire free air temperature'. Equivalent temperatures have been worked out to enable data based on this temperature to be related to many types of element.



Graph showing Straight Wire Free Air Temperature/Current Flow for Brightray C

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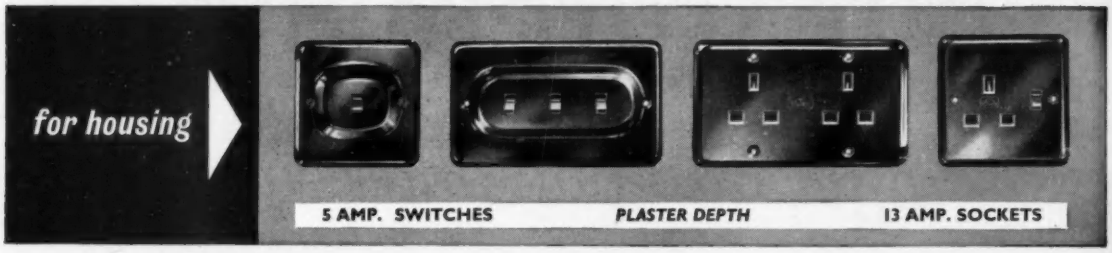

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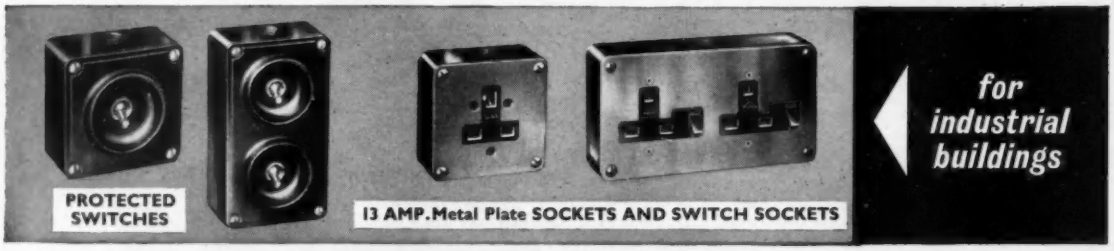

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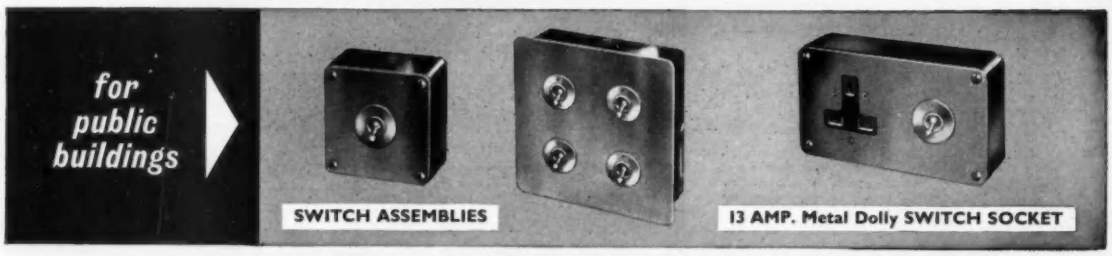

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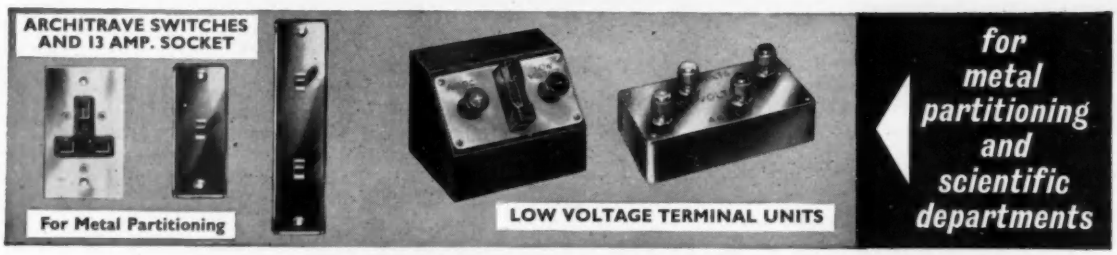
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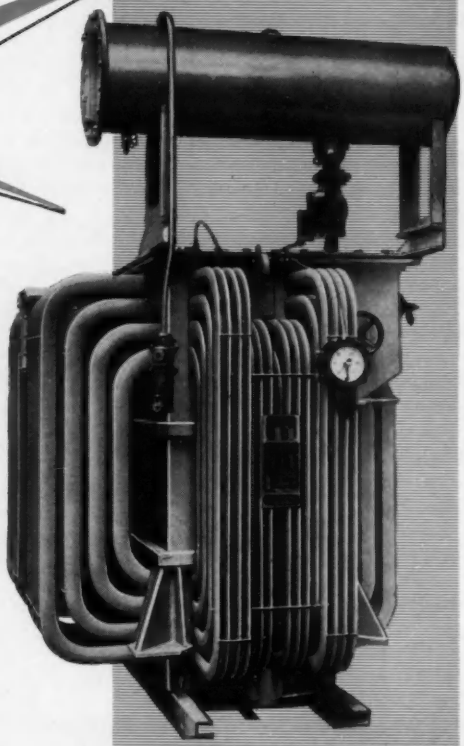

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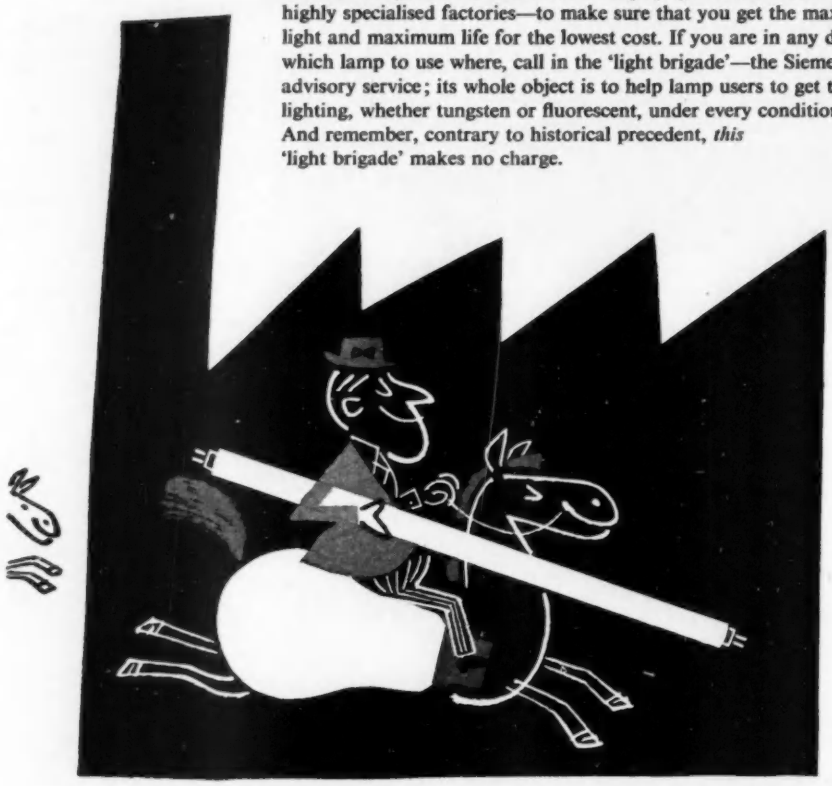

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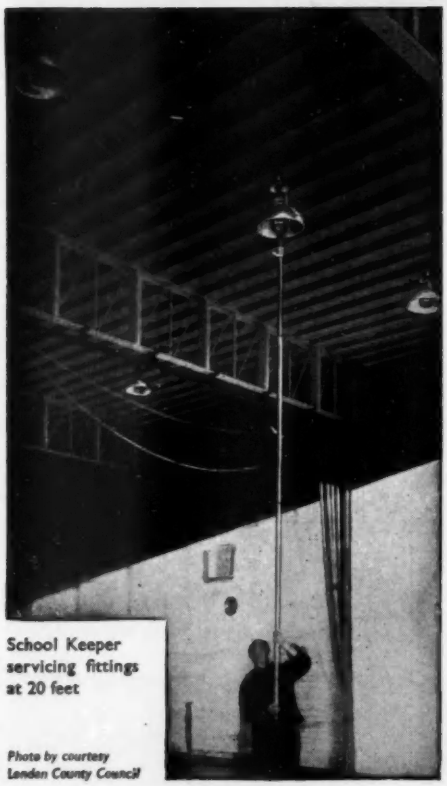
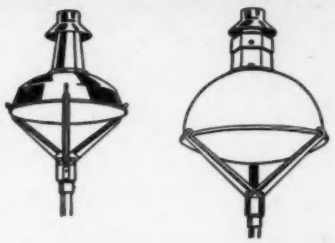


School Keeper servicing fittings at 20 feet

Photo by courtesy London County Council



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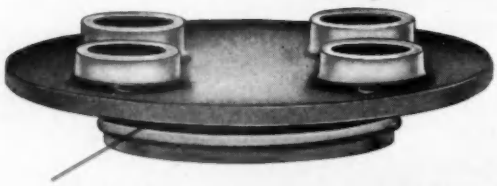

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Photograph of the Viscount by courtesy of Messrs. Vickers-Armstrongs (Aircraft) Limited.

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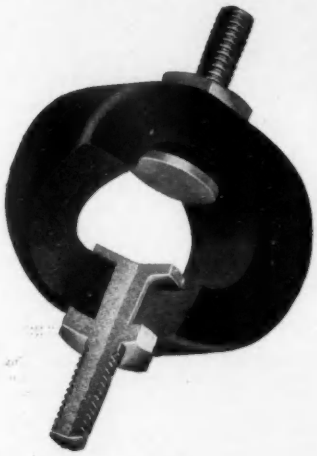

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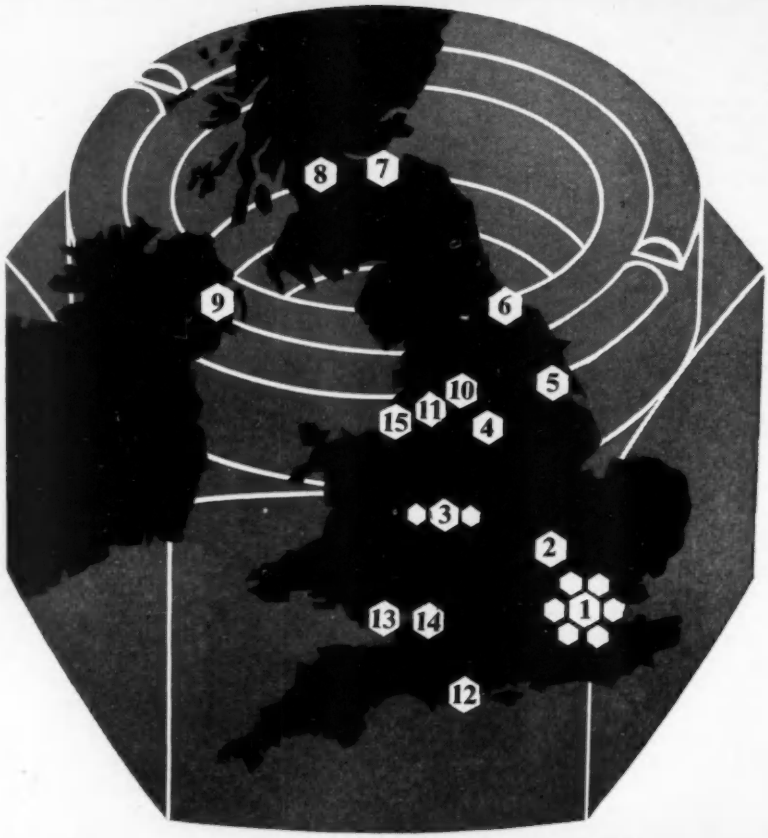

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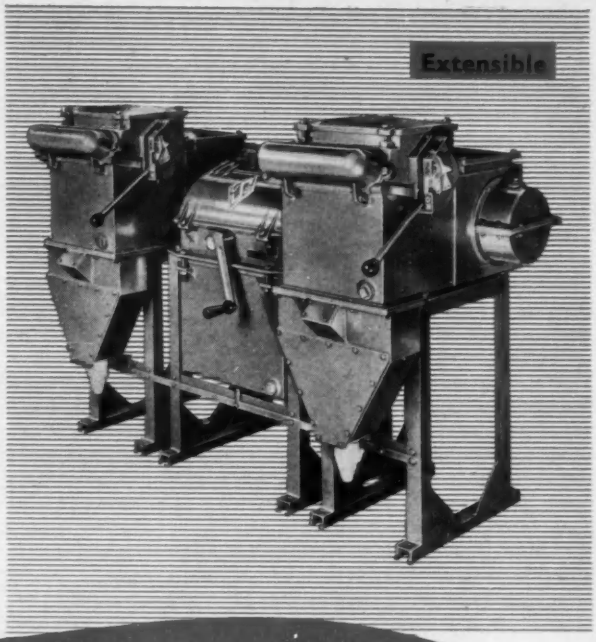

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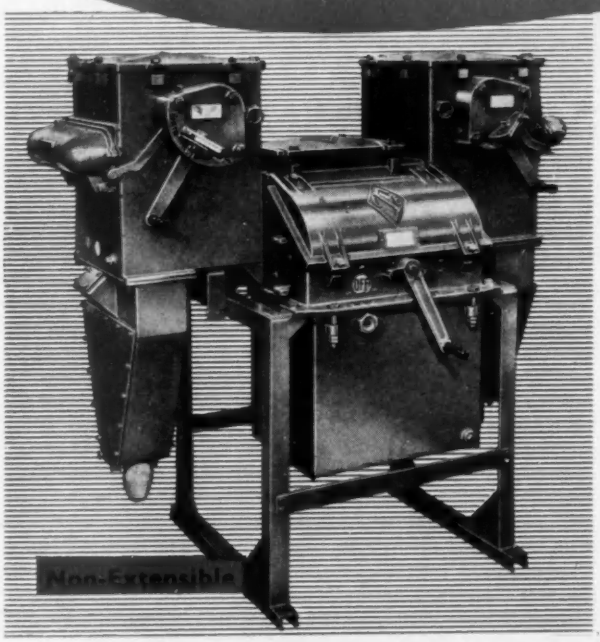

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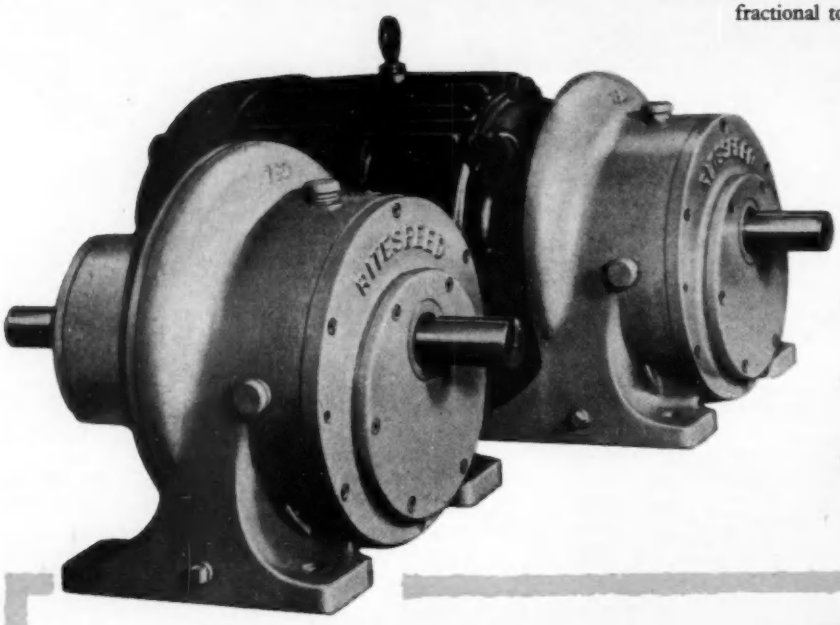

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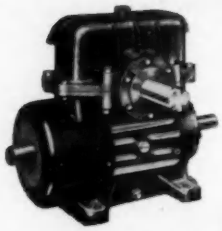

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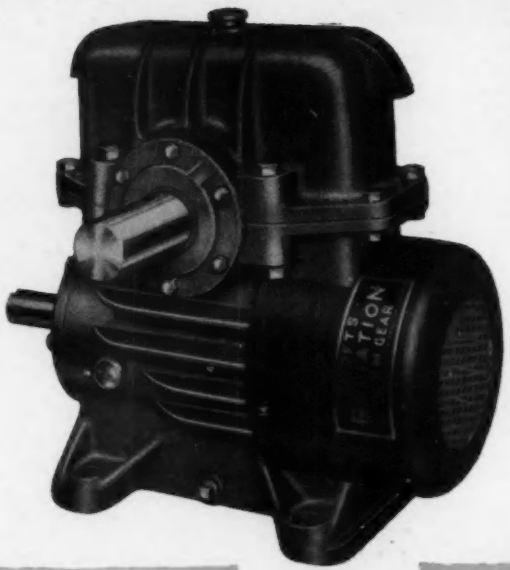

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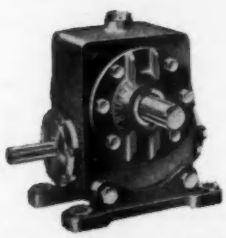

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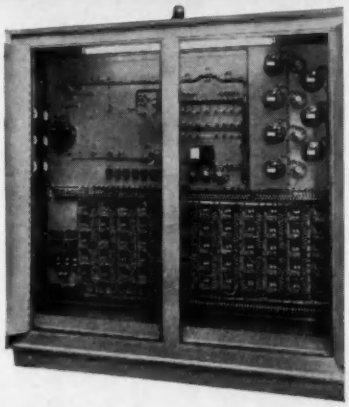

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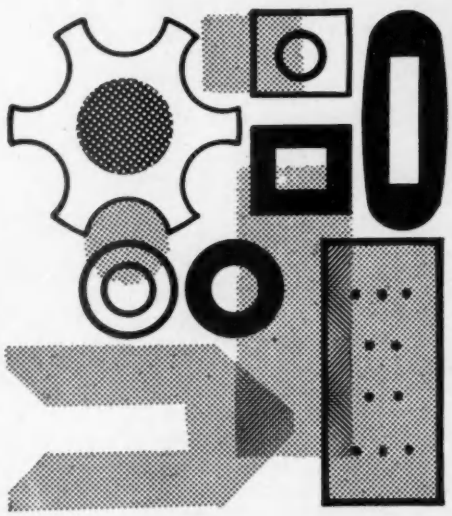

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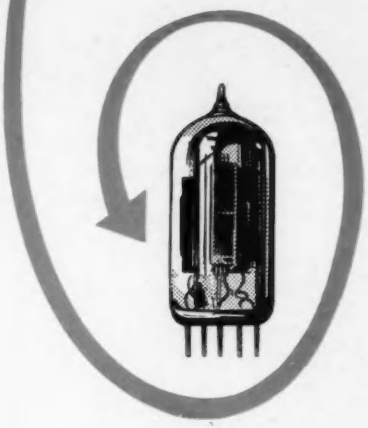

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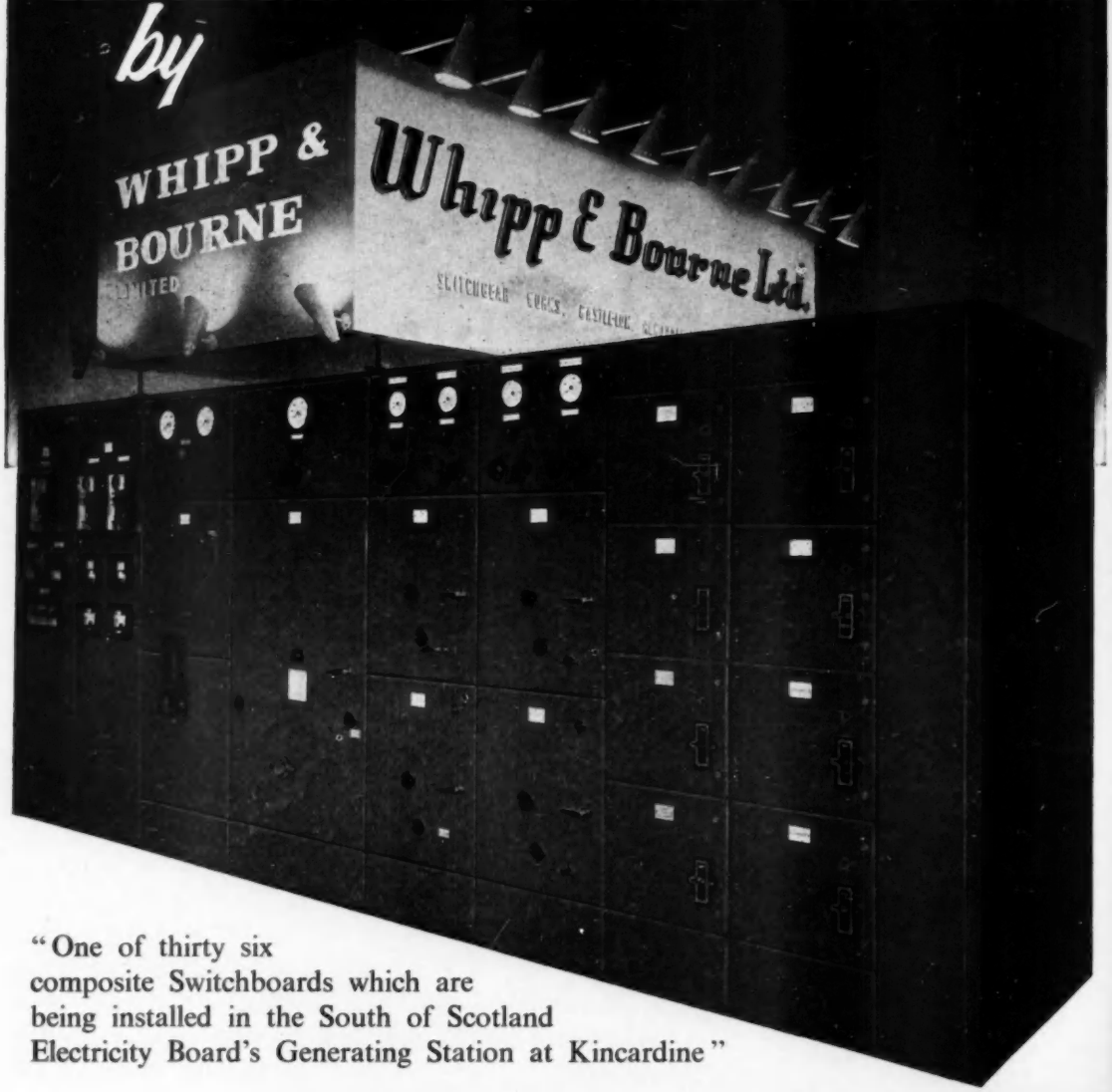

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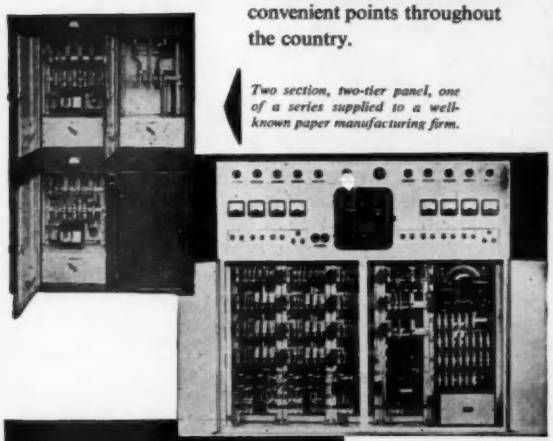

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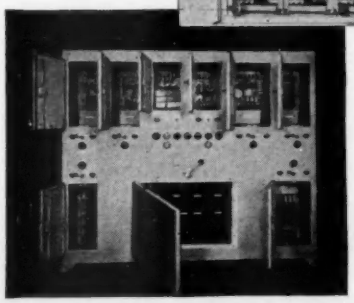

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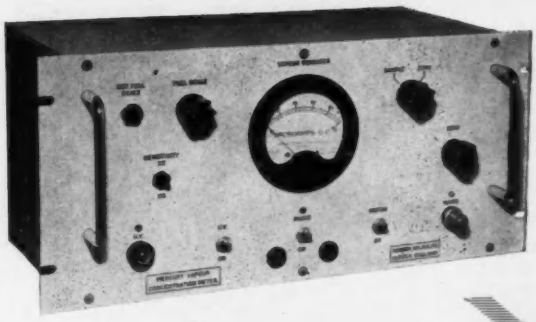

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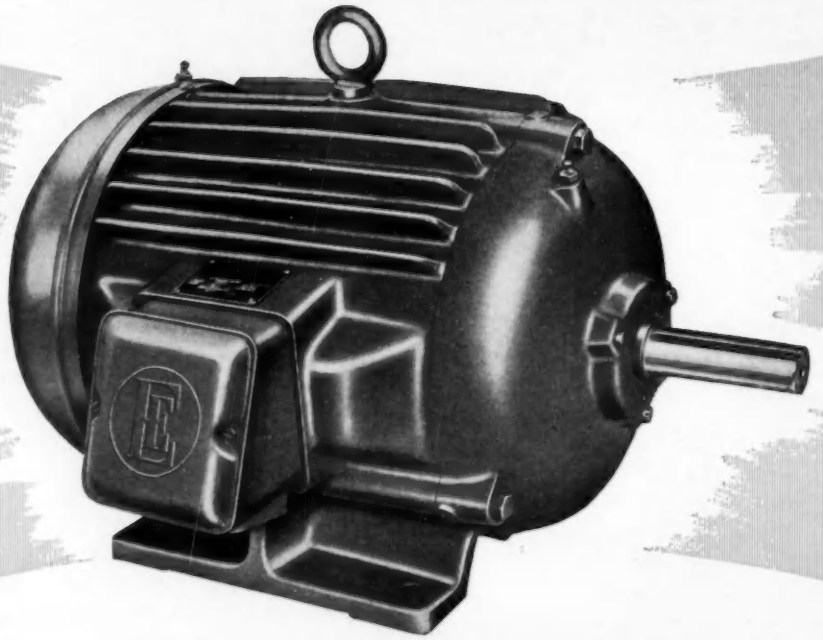

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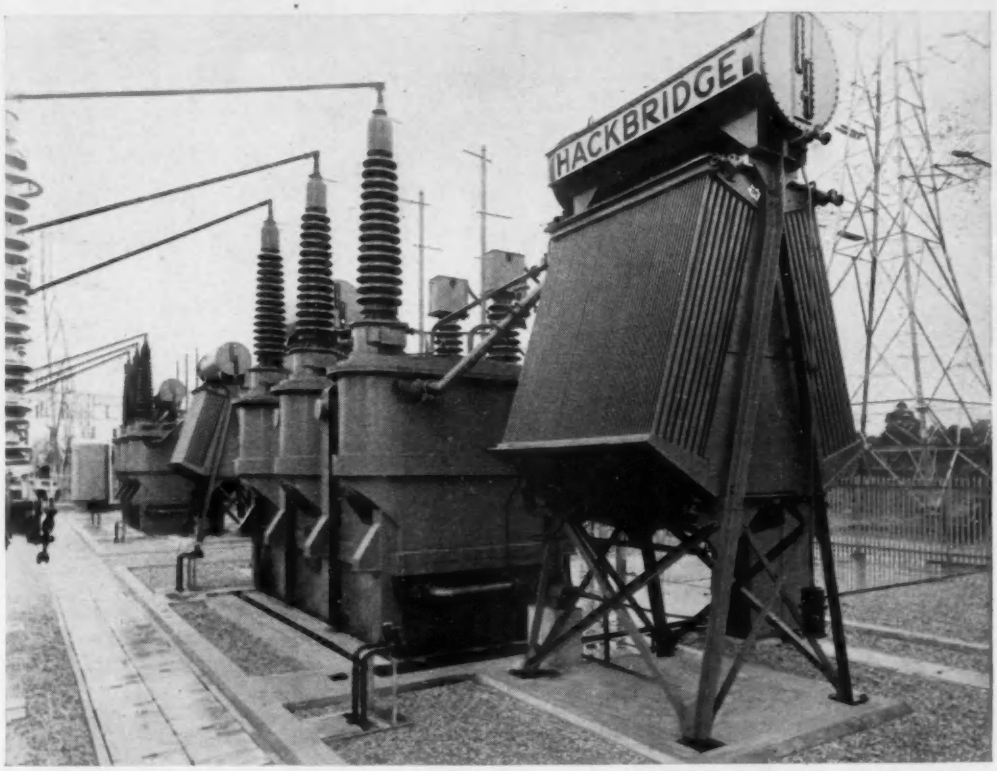

120 MVA

The illustration shows two 120 MVA 275/132 kV Hackbridge transformers installed at West Weybridge substation, Central Electricity Generating Board. A further similar unit is installed at Fleet whilst another is in course of manufacture.

180 MVA

Instructions have now been received from the Central Electricity Generating Board for the manufacture of four 180 MVA 275/132 kV Hackbridge transformers, two for installation at Fleet, and one each for Exeter and Taunton.

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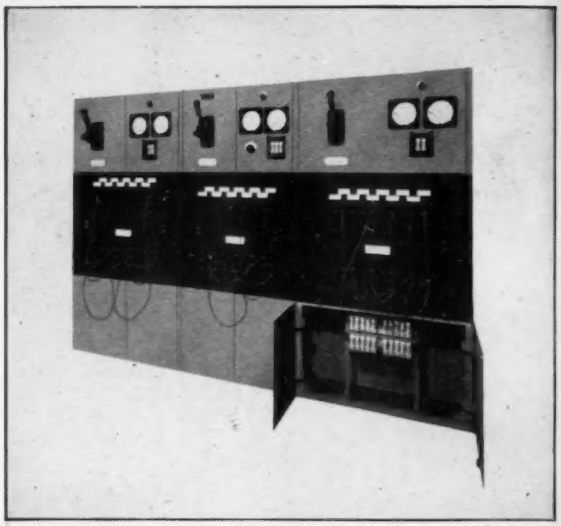

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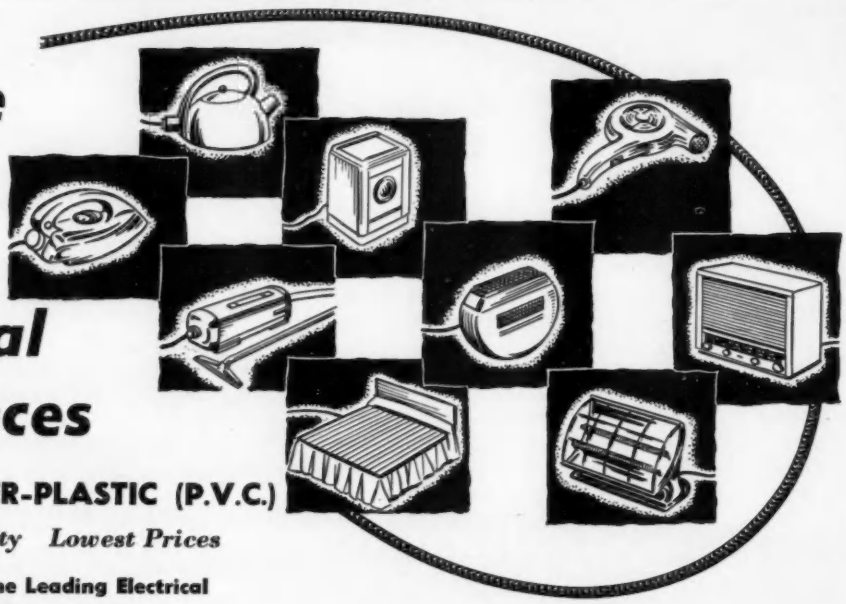

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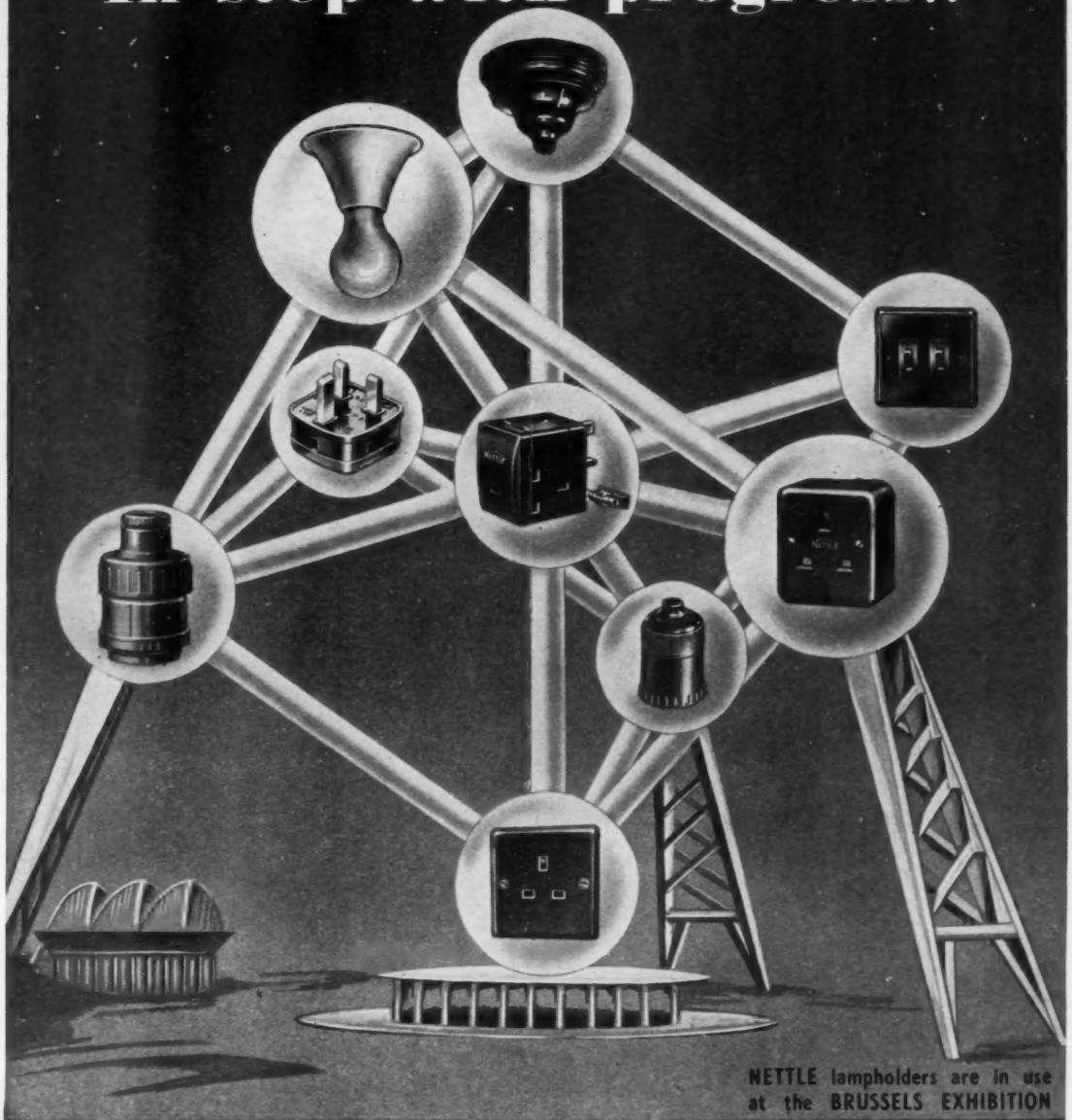

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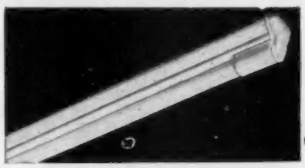

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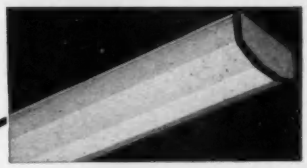

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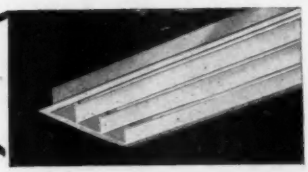

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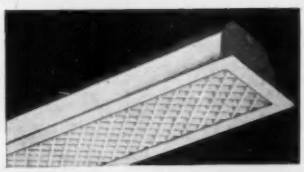

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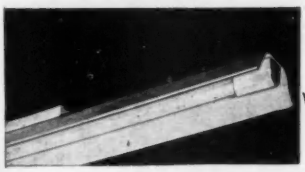

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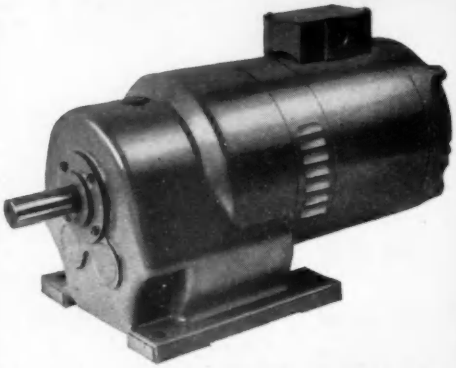

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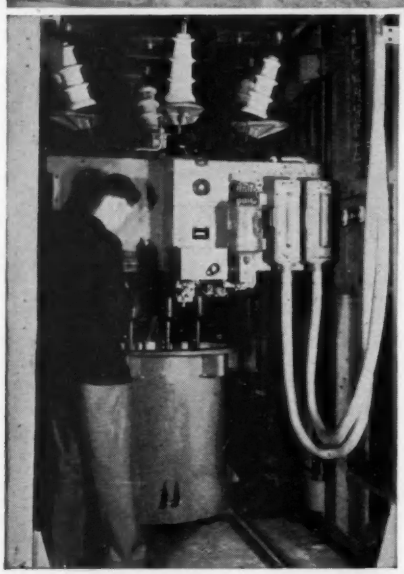

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Above: Seven-panel switchboard on a restricted site in South Wales.

Left: Single unit with tank lowered and breaker in isolated position.

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CLARKE BROS. (Stroud) LTD.
Green Park Street, Aberavon
Telephone: Port Talbot 791
Electrical Engineers and Contractors
Rewinds and Repairs. Industrial Installations

DRAKE & GORHAM (Contractors) LTD.
13 St. Andrew's Crescent, Cardiff
Telephone: Cardiff 32080
Electrical Engineers and Contractors

. . . for all electrical installations
F. H. WHEELER & CO. LTD.
117 Woodville Road, Cardiff
Telephone 21281-2 *Telegrams: "Whelect"*

CLARKE BROS. (Stroud) LTD.
High Street, Merthyr Tydfil
Telephone: Merthyr Tydfil 377
Electrical Engineers and Contractors
Rewinds and Repairs. Industrial Installations

MERSEYSIDE & N. WALES

TROUGHTON & YOUNG LTD.
46 Rodney Street, Liverpool 1
Telephone: Royal 9231-2
Electrical Engineers and Contractors

H. J. CASH & CO. LTD.
28 Chapel Street, Liverpool 3
Telephone: Central 0452
Electrical Engineers and Contractors

YORKSHIRE

Electrical Engineers and Contractors
SOUTHERN & REDFERN LTD.
Woodhead Road, Bradford 7
Textile Maintenance, Repairs and Rewinds
Telephones: Bradford 23871—Late Phone: Bradford 65837

DALE ELECTRIC (YORKSHIRE) LTD.
Filey, Yorks. Also at Malton and Driffield
Telephone: Filey 2301 (3 lines)
Electrical Contractors and Manufacturers
Estimates given for all types of electrical installations without obligation

EDMUNDSONS CONSTRUCTION CO. LTD.
Electrical Engineers and Contractors
2 Hartley Hill, Leeds 2
Telephone: Leeds 33791

. . . for all electrical installations
F. H. WHEELER & CO. LTD.
44 Bank Street, Sheffield 1
Telephone 24015 (3 lines) *Telegrams: "Whelect"*

NORTH WESTERN

H. J. CASH & CO LTD.
28 Chapel Street, Liverpool 3
Telephone: Central 0452
Electrical Engineers and Contractors

STEWART THOMSON & SONS (Liverpool) LTD.
Fort Road, Seaforth, Liverpool 21
Repairs and Rewinds A.C. and D.C. to 3,000 horsepower. Breakdowns, Urgent Repairs, etc. 24-hour service
Telephone: Bootle 2697-8

DRAKE & GORHAM (Contractors) LTD.
21 Newton Street, Piccadilly, Manchester 1
Telephone: Manchester Central 4701
Electrical Engineers and Contractors

. . . for all electrical installations
F. H. WHEELER & CO. LTD.
Regal Buildings, Oxford Road, Manchester 1
Telephone: Central 8207-8

Industrial Installations
W. H. SMITH & CO. ELECTRICAL ENGINEERS LTD.
12 York Street, Manchester 2
Telephone: CENtral 2991-6
Works: Praed Road, Trafford Park, Manchester 17

THE NELSON ENGINEERING CO. LTD.
Telephone: Nelson 1545/6
Electrical and Mechanical Engineers.
Complete Industrial Installations. Rewinds
Netherfield Road, Nelson

NORTH EASTERN

DALE ELECTRIC (YORKSHIRE) LTD.
Filey, Yorks. Also at Malton and Driffield
Telephone: Filey 2301 (3 lines)
Electrical Contractors and Manufacturers
Estimates given for all types of electrical installations without obligation

. . . for all electrical installations
F. H. WHEELER & CO. LTD.
52 Elswick Road, Newcastle
Telephone: Newcastle 36271

Applications for particulars of costs and standard style of advertisements in this Regional Guide should be addressed to :

THE
ADVERTISEMENT DEPARTMENT,
ELECTRICAL REVIEW,
DORSET HOUSE, STAMFORD STREET,
LONDON, S.E.1

MERCURY SWITCHES

will solve your switching problems
We offer completely reliable switches
coupled with good delivery

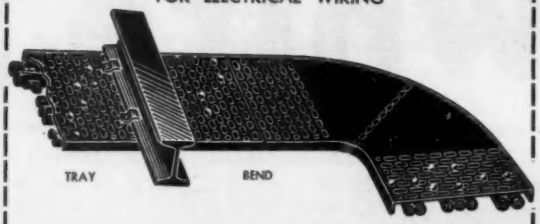
Write for catalogue

QUICKSILVER TUBE MFG. COMPANY
Willow Road, Poyle Estate, Colnbrook, Bucks.
Tel.: Colnbrook 2382

PERFORATED METALS
FOR ALL ELECTRICAL REQUIREMENTS

Perforated Lead for Batteries

CABLES—TRAYS and BENDS
FOR ELECTRICAL WIRING



W. BARNS & SON
(HOLLOWAY) LTD.

Successors to W. BARNS & SON — Established 1860

GLOBE WORKS, QUEENSLAND ROAD
HOLLOWAY, LONDON, N.7

Telephone: NORTH 3347/8

Telegrams: "PERFORATION, HOLWAY, LONDON"

• INDICATOR GLASS DOMES, MINIATURE TO 2" DIAMETER
• PRECISION GLASS MOULDINGS • SEALING BEADS
• PRECISION GROUND GLASS BALLS • BALLOTINI

THE ENGLISH GLASS CO. LTD
EMPIRE ROAD, LEICESTER
Specialists in small glass mouldings EGC *Telephone: Leicester 23484-2*

PORCELAINS
for the Electrical and Allied Trades

GASKELL & GROCOTT LTD.
Whitehall Works, Porthill, Staffs
Telephone: Newcastle (Staffs) 52241-2-3

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for EVERYTHING ELECTRICAL by the best makers

(WHOLESALE ONLY)

Prompt and personal attention. Deliveries throughout LANCASHIRE by our own vans (elsewhere by B.R.S.)

CMA and other CABLES; MEM SWITCHGEAR; CONDUIT and all WIRING SUPPLIES; FHP MOTORS; LIGHTING, HEATING and DOMESTIC APPLIANCES; BLACK & DECKER and BRIDGES ELECTRIC TOOLS, etc.

We carry good stocks; enquiries welcomed.

LEONARD HEYS LTD. *(Electrical Division)*
CASTLEGATE, LYTHAM ROAD, BLACKPOOL.
Phone 28364. Grams: HEYS BLACKPOOL (TELEX). Telex No. 67-636.

Simple as

to select the right ***FAN***

The STANDARD AXIALS range from 12" to 27": the STANDARD CENTRIFUGAL range includes forward curve, backward curve and paddle blade.

An Airscrew Specification means what it says

Airscrew can provide the right fan at the right time from their Standard range of Axial Flow and Centrifugal Fans. The Airscrew Technical Service is ready to assist in fan selection from the Standard ranges or by special design when required.
Every Airscrew fan is guaranteed to give its rated duty.

AIRSCREW STANDARD FANS

THE AIRSCREW CO. & JICWOOD LTD., WEYBRIDGE, SURREY Weybridge 2242/7

ATLAS LEADS AGAIN!

atlas white

the most efficient fluorescent tubes

for the 5ft. 80 watt tube **65 lumens per watt**

for the 4ft. 40 watt tube **70 lumens per watt**

	Lumen output at 100 hrs.
8 ft. 125 watt	8,500
5 ft. 80 watt	5,200
4 ft. 40 watt	2,800
2 ft. 20 watt	1,100

An improved phosphor and new manufacturing techniques enable Atlas to achieve the highest ever efficiencies at 100 hours for Atlas 'Double-life' White tubes, with corresponding increases in the average through life figures. Remember, all Atlas White Tubes carry the Atlas Double Life Guarantee.

atlas

LIGHTING LIMITED

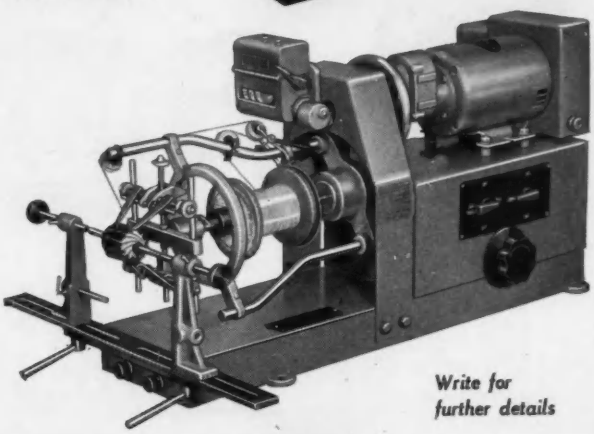
A SUBSIDIARY COMPANY OF THORN ELECTRICAL INDUSTRIES LTD.
233 Shaftesbury Avenue London WC2

QUICKWAY

Armature winding machines

The "QUICKWAY" range includes the well known Coilwinding and Forming Machine, Taping Machine, Coil Winding and Banding Machine, and Armature Winding Machines.

Illustrated is the "QUICKWAY" Model 2 B Armature Winding Machine which is fully adjustable for batch production or repair work and is equipped with automatic turns counter. Other models available for continuous production.



Write for further details

THE MIDLAND DYNAMO CO. LTD.

QUICKWAY WORKS - LEICESTER - Tel: 20172 (5 lines) Grams: "DYNAMO" Leicester

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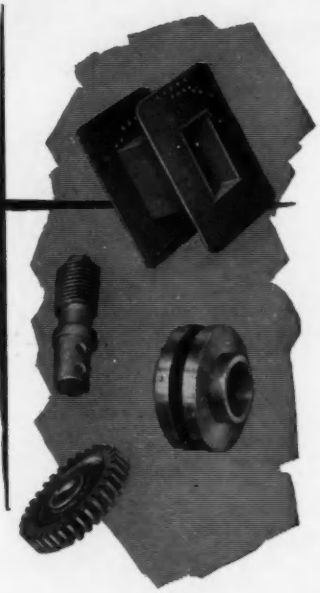
SYNTHETIC RESIN BONDED LAMINATE

brings you
MATERIAL SOLUTIONS
to your
CURRENT PROBLEMS

. . . because the range of PIRTOID Paper and Fabric base laminates affords all the machining qualities needed with consistent uniform dielectric and mechanical strength. Read this booklet, sent gladly on request.



H. CLARKE & CO. (MANCHESTER) LTD

Atlas Works · Patricroft · Manchester

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MONMORE CONDUITS

The Finest Quality no matter where you look . . .

speedy delivery too!

IN DUCTILE STEELS GROUP

MONMORE CONDUITS LTD

WOLVERHAMPTON *Telephone : 27091 (5 lines)*

STEEL SHELVING

72" HIGH
34" WIDE
12" DEEP

- *Brand new—Manufactured in our own works*
- *Shelves adjustable every inch*
- *Heavygaugeshelves will carry 400 lbs. each*
- *Stove enamelled bronze green*
- *6 shelves per bay—Extra shelves 8/- each*
- *Quantity discounts*

DELIVERED FREE
£3.15.0
Ready for Erection

N. C. BROWN LTD.

Rochdale Road Works
HEYWOOD · LANCS
—the manufacturers!

ALL OTHER SIZES available at equally keen prices.

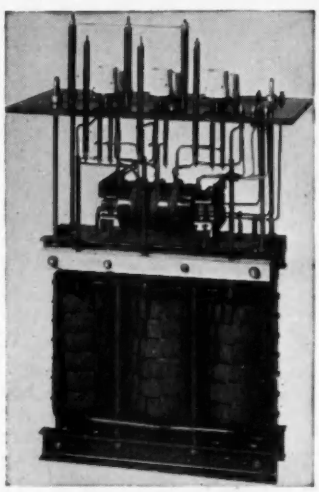
Telephone: Heywood 69018 (3 lines)

TRANSFORMERS

FOR DISTRIBUTION AND INDUSTRY

Rectification for D.C. equipment · Testing units (1 or 3 ph.) with multiple tapping switch · Isolating transformers for electrical tools · Transformers for electronic equipment up to 30 kV · All industrial requirements up to 250 kVA.

Our transformers comply with all relevant B.S. specifications.



25 kVA rectifier unit for 12,000 v. D.C.

S.T.L. *Transformers are widely used in industry. where reliable units are required for continuous duty.*

STEWART TRANSFORMERS LTD.
Kilburn Lane London W.10 Tel. LADbroke 2296/7

Still *more* light from EKCO white

FLUORESCENT TUBES

40 W. 4 ft. *NOW* 70 lumens/watt
80 W. 5 ft. *NOW* 65 lumens/watt
125 W. 8 ft. *NOW* 68 lumens/watt

New manufacturing technique and improved phosphors enable EKCO to produce the highest ever efficiency tube.

125W 8 ft. increased to 8500 lumens
80W 5 ft. increased to 5200 lumens
40W 4 ft. increased to 2800 lumens
20W 2 ft. increased to 1100 lumens

Above efficiencies at 100 hours. Corresponding increases are maintained throughout life.

THE MOST EFFICIENT FLUORESCENT TUBES ARE, OF COURSE, MADE BY EKCO

EKCO-ENSIGN ELECTRIC LTD. 45, ESSEX STREET, STRAND, LONDON W.C.2. Telephone: CITY 8951

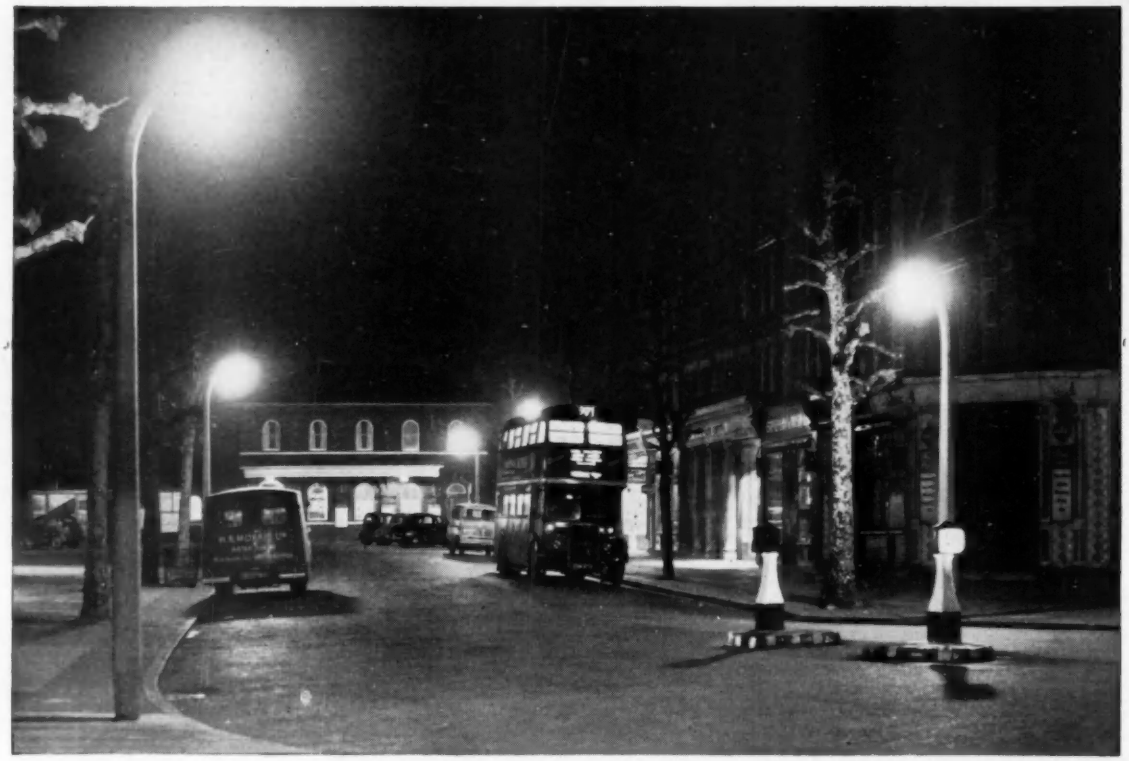
SALES OFFICES · ILLUMINATING ENGINEERING DEPARTMENTS · SHOWROOMS AND DEPOTS IN

MANCHESTER · BIRMINGHAM · NOTTINGHAM · GLASGOW · CARDIFF

EL58

G.E.C.

Side road lighting at KEW



G.E.C. Side Road Lighting at Kew, Surrey

As part of a major scheme over 1,000 G.E.C. side road fluorescent lanterns together with Brevis Prestressed-Plus concrete columns have been supplied to the Borough of Richmond.

The lantern houses two 2 ft. 40 W. Osram fluorescent tubes and the gear necessary to operate them is supplied fitted within the lantern body.

Light control is obtained by four "Perspex" refractor plates, bonded two to each inner side of a "Perspex" bowl.

The illustration shows part of the installation at Station Parade, Kew.

Classified Advertisements

CLASSIFIED advertisements are PREPAID at 3/6 per line (approx. 6 words) per insertion. Where an advertisement includes a Box Number there is an additional charge of 1/-.

DISPLAYED CLASSIFIED:—48/- per inch. Cheques and Postal Orders should be crossed and made payable to ELECTRICAL REVIEW PUBLICATIONS LTD.

SERIES DISCOUNTS for consecutive insertions:—13, 5%; 26, 10%; 52, 15%.

SITUATIONS WANTED:—Three insertions under this heading can be obtained for the price of two if ordered and prepaid with the first insertion.

REPLIES to Box Numbers should be addressed to the Box Number in the advertisement, c/o ELECTRICAL REVIEW, Dorset House, Stamford Street, London, S.E.1, but if not to be delivered to any particular firm or individual they should be accompanied by instructions to this effect, addressed to the Manager of the ELECTRICAL REVIEW. Replies in such cases cannot be returned. The name of an advertiser using a Box Number will not be disclosed.

ADVERTISEMENTS are accepted up to First Post on Monday of the week of issue and should be addressed to ELECTRICAL REVIEW, Classified Advertisement Department, Dorset House, Stamford Street, London, S.E.1.

Original testimonials should not be sent with applications for employment

OFFICIAL NOTICES, TENDERS, ETC.

CITY OF ST. ALBANS

Street Lighting

TENDERS are invited for the erection and wiring only of the following:—

(a) 30 Group A steel columns, lanterns and gear.
(b) 33 Group B concrete columns and lanterns.
(c) 40 Group B cast iron columns and lanterns.
(d) Replacement of 100 Group A sodium vapour lanterns.

Bills of quantities, specification and form of tender may be obtained from the City Engineer and Surveyor, 16, St. Peter's Street, St. Albans.

Sealed tenders must be returned to the undersigned in envelopes, bearing no indication of the sender not later than 12 noon on Tuesday, 23rd September, 1958.

The Council do not bind themselves to accept the lowest or any tender.

W. B. MURGATROYD,
Town Clerk.

38, St. Peter's Street,
St. Albans, Herts. 4716

URBAN DISTRICT COUNCIL OF HAVANT AND WATERLOO

invite fixed price tenders for

(1) the supply of lanterns and lamps;
(2) the supply of steel, cast iron or alloy columns and brackets;
(3) the erection and bringing into service of the above equipment;

in respect of the provision of 79 100-watt Tungsten Street Lights on various housing estates within the Urban District.

Tender documents may be obtained from and general conditions of contract inspected at the office of the Engineer and Surveyor, 1, Park Road North, Havant. No tender will be received except in a plain sealed envelope which may bear the word "Tender" followed by the subject to which it relates, but shall not bear any name or mark indicating the sender.

Tenders must be delivered not later than 12 noon on Monday, 15th September, 1958, to the Clerk of the Council, Town Hall, Havant.

The Council do not bind themselves to accept the lowest or any tender. 4685

INDIA STORE DEPARTMENT

THE Office of the Chief Engineer, Madras Port Trust, Madras, India, invite tenders for the following:—

Tender Enquiry No. 16/EP3/2415/58 for the supply and erection of H.T. and L.T. Switchgear for Substation D.

Specifications, drawings, etc., relative to the above can be obtained direct from the Deputy Chief Accounts Officer (Engineering), Chief Engineer's Office, Madras Port Trust, Madras, India, on payment of fifteen shillings per set which is not refundable. Tenders are to be returned direct to the Chief Engineer's Office (at C Warehouse) Madras Port Trust, Madras, India, so as to reach them by 3 p.m. on 13th October, 1958.

Specimen copy of the above specification can be seen at "India Store Department," Government Building, Bromyard Avenue, Acton, London, W.3, under reference S.3605/58/AVH/Eng.2. 4651

CLASSIFIED ADVERTISEMENTS ARE PREPAID

OLD FLETTON URBAN DISTRICT COUNCIL

TENDERS are invited for the installation of 30 Sodium Discharge Lamps (140 watts) to Group A standard.

The work includes the supply and erection of tubular steel columns, supply and fixing of lanterns, lamps, auxiliary equipment and wiring.

Forms of tender, plans, specification and bills of quantities may be obtained from the Surveyor, Council Offices, High Street, Old Fletton, Peterborough.

Tenders, in envelopes to be supplied, should reach me at the above address not later than 30th September, 1958.

The Council do not bind themselves to accept the lowest or any tender.

F. GREENWOOD,
Clerk of the Council.
4686

INDIA STORE DEPARTMENT

THE Director General, India Store Department, Government Building, Bromyard Avenue, Acton, London, W.3, invites tenders for the supply of:—

PLANTS, Welding, Electric, Double Operator, Motor Driven, 400/440 A.C.

Tender schedule and specifications may be purchased from the above address at a cost of 10 shillings, which is not refundable, quoting reference 1523/58/CLL/Eng. 3A.

Completed tenders with specifications are to be submitted by Monday, 29th September, 1958. 4639

SITUATIONS VACANT

YORKSHIRE ELECTRICITY BOARD

No. 3 (Sheffield) Sub-Area

SHEFFIELD DISTRICTS

ASSISTANT CONSUMERS' ENGINEER.

Applicants should have had a sound practical training in the electricity supply or electrical contracting industry and should preferably have qualifications leading to Corporate Membership of the Institution of Electrical Engineers.

They should be capable of carrying out negotiations with consumers for new and additional supplies and have a sound knowledge of tariffs and their appropriate applications. They should have had experience of general load development in the industrial, space heating and catering fields, be fully conversant with the wiring rules and regulations of the I.E.E., be capable of preparing electrical schemes and specifications and have had experience of controlling staff and workpeople.

Salary N.J.B. Class L, Grade 12, £885/£15/£930 per annum.

SUB-AREA HEADQUARTERS

SENIOR DRAUGHTSMAN (Electrical).

Applicants should have had a good general and technical education to at least O.N.C. standard, with experience in the electrical layout of substations and the preparation of diagrams for electrical equipment.

Salary N.J.B. Schedule D, Grade 5, £760/£20/£860 per annum.

Applications, quoting 3 SAR, and giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 3 (Sheffield) Sub-Area, Yorkshire Electricity Board, Commercial Street, Sheffield, not later than 19th September, 1958. 4687

SOUTHERN ELECTRICITY BOARD

Development Engineer

Ealing District of No. 1 (Southall) Sub-Area. Salary N.J.B. Class H, Grade 8 (£985-£1,045 per annum, inclusive of London allowance). N.J.B. conditions of service.

Applicants should be qualified to accept responsibility for handling all enquiries on contracting, tariff and supply matters, to give electro-technical advice to all classes of consumers including industrial consumers on all aspects of tariffs and on the most economic and efficient utilisation of electricity, to co-ordinate the duties of service representatives, agricultural representatives, refrigeration representatives and demonstrators and to supervise showrooms.

Applications on forms obtainable from the Sub-Area Secretary, 2-6, Windmill Lane, Southall, and returned to him, quoting Z.942, not later than 15th September, 1958.

General Assistant Engineer (Meter Section)

No. 1 (Southall) Sub-Area Engineering Department, Waterloo Road, Uxbridge, Middlesex. Salary N.J.B. Class L, Grade 16 (£725-£770 per annum, inclusive of London allowance). N.J.B. conditions of service.

Applicants should have experience in three-phase meter testing, instrument transformer testing, assisting in the standardising of wattmeters and the commissioning of special equipment.

Application on forms obtainable from the Sub-Area Secretary, 2-6, Windmill Lane, Southall, Middlesex, and returned to him, quoting Z.902, not later than 22nd September, 1958.

General Assistant Engineer

Swindon District of No. 2 (Newbury) Sub-Area. Salary N.J.B. Class F, Grade 13 (£590-£635 per annum). N.J.B. conditions of service.

Applicants should possess suitable technical qualifications and will be required to assist with distribution duties including minor construction work and general maintenance of H.V. and L.V. overhead and underground distribution systems, substation plant, etc. This appointment may involve standby duties.

Applications on forms obtainable from the Sub-Area Secretary, 7, Oxford Road, Newbury, and returned to him quoting Z.941, not later than 15th September, 1958.

The successful candidates for the above posts will be required to contribute to the Electricity Supply (Staffs) Superannuation Scheme, if eligible. 4697

SOUTH OF SCOTLAND ELECTRICITY BOARD

Clyde Area

Appointment of Fourth Assistant Engineer (Protection and Test), Test Department, Yoker

APPLICANTS should preferably be Graduate Members of the Institution of Electrical Engineers and have had experience in the commissioning, routine testing and maintenance of H.V. feeder protection systems and transformers. Salary Class K, Grade 13, £790/£835 per annum, subject to standard deductions including superannuation and income tax. The successful candidate would require to reside within reasonable distance of Yoker.

Applications, on the appropriate form, should be forwarded to this office within 7 days of the date of this advertisement.

DANIEL ROSS,
Manager.

206, St. Vincent Street,
Glasgow, C.2.
25th August, 1958. 4641

Situations Vacant (continued)

EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments. The successful candidates will be required to contribute to a superannuation scheme and may be required to undergo a medical examination.

Essex Sub-Area Headquarters

THIRD ASSISTANT ENGINEER (Planning and Development (87/58.R).

Candidates should have had a sound technical training and suitable experience in the design and layout of indoor and outdoor substations and overhead and underground systems up to 33 kV. They should preferably be Graduate Members of the Institution of Electrical Engineers.

Salary N.J.B. Class L, Grade 10 (£995-£1,055), plus London allowance.

Apply by letter, within 14 days, to E. A. Cullen, M.I.E.E., Engineer, Essex Sub-Area, Eastern Electricity Board, Millfield, Bentley, Nr. Brentwood, Essex.

Northmet Sub-Area

WOOD GREEN DISTRICT

THIRD ASSISTANT ENGINEER (Ref. 803) (88/58.R).

Candidates should have had a sound technical training and suitable experience in the construction, operation and maintenance of H.V. and L.V. distribution systems, including substations, at voltages up to 33 kV.

Salary N.J.B. Class F, Grade 9 (£790-£835), plus London allowance.

Apply by letter to R. A. Voit, M.I.E.E., Manager, Eastern Electricity Board, 13/27, Station Road, Wood Green, London, N.22, by 15th September, 1958.

St. Albans District

SERVICE CENTRE SUPERVISOR, HARPENDEN (Ref. 801) (89/58.R).

Candidates should be capable of taking charge of a service centre and accepting responsibility for its trading results. The post requires an ability to buy stock for retail trade and an understanding of the principles of display. Candidates should have had extensive sales and consumer service experience and possess a thorough knowledge of appliances, the application of tariffs and have an understanding of installation contracting requirements for domestic purposes.

Salary N.J.C. Grade 2 (£615-£675).

Apply by letter to F. J. Drake, Assoc.I.E.E., Manager, Eastern Electricity Board, 107, St. Peter's Street, St. Albans, by 15th September, 1958. 4691

CENTRAL ELECTRICITY GENERATING BOARD

Southern Division

APPLICATIONS are invited for the following positions:—

FOURTH ASSISTANT ENGINEER, ALDERSHOT SECTION (S/13.1028).

Applicants should have had experience in the maintenance and operation of 132-kV transforming stations and grid lines. The section includes the 275/132-kV substation at Fleet.

Salary N.J.B. Class AX/DX, Grade 8, £710-£910 or Grade 7, £810-£1,010.

ASSISTANT ENGINEER (Efficiency), EARLEY GENERATING STATION, READING (S/13.1021).

Applicants should have had considerable experience in the operation and testing of plant installed in a large modern generating station using pulverised fuel.

Salary N.J.B. Grade G.7, £935 × £20 to £995.

For both vacancies preference will be given to those possessing qualifications leading to Corporate Membership of a recognised professional institution.

Special application forms obtainable only from P. D. A. Oliver, Divisional Secretary, 111, High Street, Portsmouth, should be returned by 17th September, 1958. 4690

LANCASHIRE ELECTRIC LAMP FACTORY

employing most modern equipment requires

TECHNICAL ADMINISTRATIVE and PRODUCTION STAFF and REPRESENTATIVES.

Write in strictest confidence to Box 4629.

SOUTH WESTERN ELECTRICITY BOARD

Third Assistant District Engineer
East Cornwall, Liskeard

APPLICATIONS are invited from suitably qualified and experienced persons for the above appointment.

Salary according to Class E, Grade 9, £740 × £15 to £785 per annum of the N.J.B. agreement.

The duties of the successful candidate will include the supervision of overhead and underground mains construction, operation repairs and maintenance, and the operation and switching of the distribution network up to and including 33 kV. He will be required to undertake standby duty.

Possession of appropriate technical qualifications at least equal to the Higher National Certificate in Electrical Engineering, and a current driving licence are desirable.

Applications to be made on official form obtainable by postcard only from District Manager, South Western Electricity Board, Luxstowe, Liskeard, Cornwall. Closing date for receipt of completed applications is 16th September, 1958. 4693

ELECTRICITY CORPORATION OF NIGERIA

Vacancy for Instructor—Overhead Lines

APPLICATIONS are invited from suitable candidates for appointment as OVERHEAD LINES INSTRUCTOR in the Corporation's Training School at Lagos, Nigeria.

Candidates should be not more than 45 years of age and must have had a wide experience in the construction of overhead transmission lines of all types up to 132 kV, using wood poles, steel tubular poles, and steel lattice towers.

Preference will be given to candidates who, in addition to extensive practical experience in the field, also hold the H.N.C. in Electrical Engineering, and previous experience as an instructor will be a distinct advantage.

The selected candidate will be required to undertake the instruction and training of Nigerian apprentice linesmen up to full technician grade under the direction of the Training and Education Officer.

The appointment will be on contract terms for two tours of 18-24 months each in the first instance, the salary being in Scale 15, i.e. £930 × £36 to £1,074 per annum, the point of entry depending upon experience. A contract allowance of 10% of basic salary will be payable, plus £270 per annum inducement addition.

On the satisfactory conclusion of service with the Corporation a gratuity equal to 25% of the aggregate salary and inducement addition earned during the period of service will be payable.

Application upon forms to be obtained from The Electricity Corporation of Nigeria, Nigeria House, 9, Northumberland Avenue, London, W.C.2, must be returned completed not later than 17th September, 1958.

4665

CLERK OF WORKS (Electrical)

required by W.D. in Wiltshire. Applicants must be of British parentage and have O.N.C. in Electrical Engineering or equivalent and five years' apprenticeship or equivalent with engineering concern.

Experience: Further three years with engineering firm or three years as supervisor of labour, chargehand or technical officer in engineering industry.

Salary according to age, qualifications and experience in range £705 (at age 28) to £820.

Apply C.R.E. North Wilts, Prince Maurice Barracks, Devizes, Wilts. 4676

EAST MIDLANDS ELECTRICITY BOARD

Leicestershire and Warwickshire Sub-Area

(a) Second Assistant Engineer (Construction)
(b) Fourth Assistant Engineer (Construction)
(c) Fourth Assistant Engineer (Construction)

APPLICATIONS are invited in respect of the above appointments in the Leicestershire and Warwickshire Sub-Area :—

(a) The duties of this post will consist of the field planning, survey and construction of H.V. overhead and underground circuits up to and including 33 kV, and the installation of substation plant and equipment. The duties will be related to work by direct labour and the supervision of contractors. Experience in the preparation of specifications and estimates will be an advantage, and preference will be given to candidates who possess a technical qualification equivalent at least to the Higher National Certificate in Electrical Engineering.

(b) Generally the duties of this post will be similar but subsidiary to those of the Second Assistant Engineer stated above.

(c) The duties of this post will consist of assistance in the preparation of plans and specifications for building and civil engineering works related to substations of all types and supervision of site works by direct labour and by contract.

Salaries and conditions of the appointments will be in accordance with the National Joint Board Agreement as follows :—

(a) Second Assistant Engineer (Construction), Sub-Area Headquarters: Class K, Grade 8, £1,065 to £1,140 per annum.

(b) Fourth Assistant Engineer (Construction), Sub-Area Headquarters: Class K, Grade 12, £835 to £880 per annum.

(c) Fourth Assistant Engineer (Construction), Sub-Area Headquarters: Class K, Grade 12, £835 to £880 per annum.

Applications, stating age, qualifications, experience, present position and salary, should be forwarded to the Manager, Leicestershire and Warwickshire Sub-Area, Upper Bond Street, Hinckley, Leics., so as to reach him within fourteen days of the issue of this advertisement. 4663

SOUTH WALES ELECTRICITY BOARD

Appointment of District Managers

(a) Merthyr/Aberdare District
(b) Rhondda District
(c) Bridgend District

IN accordance with the Board's decision to introduce a single-headed type of District Organisation, a District Manager will be appointed to each of the above Districts, and applications are invited for these positions.

Candidates should possess sound experience in the electricity supply industry, and preference will be given to those holding recognised professional qualifications.

The salaries for the posts will be in accordance with the scales agreed by the National Joint Managerial and Higher Executive Grades Committee for the Electricity Supply Industry, and are as follows :—

(a) Merthyr/Aberdare District: Salary Class C, Grade 5, £1,900/£2,100.

(b) Rhondda District: Salary Class C, Grade 5, £1,900/£2,100.

(c) Bridgend District: Salary Class B, Grade 5, £1,700/£1,900.

Applications giving full details should be addressed to the undersigned so as to arrive on or before Monday, 22nd September, 1958. Envelopes should be clearly marked "District Manager."

R. G. WILLIAMS,
Secretary.

St. Mellons,
Cardiff. 4664

TRANSFORMERS (WATFORD) LIMITED

require

EXPERIENCED SENIOR TRANSFORMER DRAUGHTSMAN.

Permanent and progressive position.

Apply:

Chief Draughtsman, Transformers (Watford) Ltd., Sandown Road, Watford.

4524

CENTRAL ELECTRICITY GENERATING BOARD

London Division

APPLICATIONS invited for following superannuable posts. Conditions of service in accordance with N.J.B. Agreement, Schedule A. Salary includes London allowance. Qualifications entitling to Graduate Membership of I.E.E. or I.Mech.E. for posts (a) and Corporate Membership for post (b) an advantage.

(a) ASSISTANT ENGINEER
(Efficiency and Testing),
BARKING "A/B" POWER STATION
(Vacancy No. 58/662).

General assistance in efficiency and testing section. O.N.C. minimum qualification. Salary Class L, Grade 17 = £675 p.a.

(b) SHIFT CHARGE ENGINEER,
DEPTFORD EAST POWER STATION
(Vacancy No. 58/663).

Practical experience in operation of power station plant essential, with character and ability to supervise staff. Salary Class J, Grade 6 = £1,210 plus £116 shift p.a.

(a) ASSISTANT ENGINEER
(Electrical Test),
FULHAM POWER STATION
(Vacancy No. 58/664).

Knowledge of testing and routine maintenance of power station electrical equipment, including generators, switchgear, transformers, motors and protective equipment. Salary Class K, Grade 15 = £725 p.a.

Applications, quoting vacancy number, to (or on form from) Central Electricity Generating Board, London Division, P.O. Box 136, London, W.1, by 15th September, 1958. 4661

JOHNSON & PHILLIPS LTD.

have vacancies for

RUBBER TECHNOLOGIST. Minimum educational requirement Inter.B.Sc. or L.I.R.I. Experience in the manufacture of rubber cables desirable, but not essential.

LABORATORY ASSISTANT for work on rubber processes. Applicants should have a General Certificate of Education.

DEVELOPMENT ENGINEER for work on paper insulated cables. Minimum educational requirement Higher National Certificate. Some experience in the cable industry desirable, but not essential.

These are staff appointments for a five-day week. Good pension scheme, holidays, canteen and sports facilities.

Applications giving full details of age, education and experience to

Employment Manager
JOHNSON & PHILLIPS LTD.
Victoria Works, Charlton, London, S.E.7.

4652

BOROUGH OF WILLESDEN

Electrical Engineering Assistant

APPLICATIONS are invited for the appointment of ELECTRICAL ENGINEERING ASSISTANT, Special Grade, £750-£1,030 per annum, plus London weighting.

Candidates should possess appropriate qualifications and should have experience in the design of electrical equipment and installation.

The Council cannot assist with housing.

Full details and form of application may be obtained from the Borough Engineer and Surveyor, Town Hall, Dyne Road, Kilburn, London, N.W.6, and must be returned to the undersigned not later than 9 a.m. on Friday, 19th September, 1958.

R. S. FORSTER,
Town Clerk. 4640

CENTRAL ELECTRICITY GENERATING BOARD

East Midlands Division

APPLICATIONS are invited for the following appointments in this Division:—

SHIFT CHARGE ENGINEERS,
DRAKELOW "A" POWER STATION
(Vacancy No. 141/58ER).

Candidates should be suitably qualified and have had experience with large capacity high pressure turbo-alternators and pulverised fuel fired boilers.

Applicants should be in possession of technical qualifications admitting to Corporate Membership of the Institution of Electrical Engineers and/or the Institution of Mechanical Engineers.

Salary will be in accordance with Class J, Grade 6 (£1,160-£1,235 per annum) of the National Joint Board Agreement, plus 10% shift enhancement.

Closing date for receipt of applications, 17th September, 1958.

This appointment will be pensionable under the terms of the Electricity Supply (Staff) Superannuation Scheme.

Applications should be submitted on the official form AE6/ACT which may be obtained from the Divisional Establishments Officer, Central Electricity Generating Board, East Midlands Division, P.O. Box 25, Barker Gate, Nottingham, and should be returned to the undersigned by the date stated. Please quote vacancy number.

DIVISIONAL CONTROLLER.
29th August, 1958. 4689

THE GENERAL ELECTRIC COMPANY LIMITED

Witton, Birmingham, 6

requires young qualified electrical engineers for work in connection with the preparation of tenders for plant and associated control gear.

The work is interesting and covers a wide field involving steel works, mining and industrial plant installation, and provides a good opportunity for young men of initiative to widen their experience and attain senior status.

Applicants should possess H.N.C. (Electrical) or equivalent, together with some knowledge of estimating and tendering.

Interviews in the strictest confidence will be arranged at any time to suit the convenience of applicants.

Adequate assistance is available to cater for change of district. Generous salary levels are offered. Salary at commencement depends on qualifications and experience.

Please apply with full particulars to—

The Staff Manager

4700

ELECTRICAL DESIGNER

APPLICATIONS are invited for an ELECTRICAL DESIGNER with experience in the design of A.C. motors up to 3.3 kV.

This is a permanent post, also offering excellent experience and varied work other than machine design to man who is capable of accepting responsibility and working with minimum supervision.

Salary commensurate with experience and technical qualifications.

Box 4486.

CENTRAL ELECTRICITY GENERATING BOARD

East Midlands Division

APPLICATIONS are invited for the following appointment in this Division:—

PLANT CONTROL ENGINEERS,
WILLINGTON "A" POWER STATION
(Vacancy No. 138/58/ER).

Candidates should have a sound technical training and experience of the operation of a power station, including electrical control room experience.

Preference will be given to candidates who possess technical qualifications to Higher National standard, and experience of pulverised fuel firing will be an advantage.

The salary will be in accordance with Class K, Grade 10 (£935-£995 per annum) of the National Joint Board Agreement, plus 10% shift allowance.

Closing date for receipt of applications, 17th September, 1958.

This appointment will be pensionable under the terms of the Electricity Supply (Staff) Superannuation Scheme.

Applications should be submitted on the official form AE6/ACT, which may be obtained from the Divisional Establishments Officer, Central Electricity Generating Board, East Midlands Division, P.O. Box 25, Barker Gate, Nottingham, and should be returned to the undersigned by the date stated. PLEASE QUOTE VACANCY NUMBER.

DIVISIONAL CONTROLLER.
27th August, 1958. 4662

A.E.I.—JOHN THOMPSON NUCLEAR ENERGY CO. LTD.

Radbroke Hall, Knutsford, Cheshire

Shift Commissioning Engineers

SHIFT COMMISSIONING ENGINEERS are required by the above company for nuclear power stations. The work will involve taking charge of a shift during the commissioning and proving phase. Applicants should preferably have had previous experience as shift charge engineer or assistant shift charge engineer in a modern power station. Training in nuclear engineering will be arranged. Applicants should be qualified engineers, a degree or membership of one of the senior engineering institutions being essential.

The offices are situated at Knutsford. The position is a permanent staff appointment, and a contributory pension scheme is in operation.

Apply in writing, giving age, experience, qualifications and present salary (which will be treated in strict confidence), to the Chief Engineer, quoting reference COM/STF.

4576

RICHARDSONS WESTGARTH (HARTLEPOOL) LIMITED

Electrical Draughtsmen

THE Richardsons Westgarth Group of Companies is actively interested in the field of nuclear power and in a wide range of marine and general engineering.

There are opportunities at Hartlepool for senior and junior draughtsmen for design and detail work on turbo-generators. Men with experience of 100-MW sets and above will be preferred, but suitable applicants with experience of small machines will receive careful consideration. The prospects are excellent for the right men.

There are pension and life assurance schemes in operation.

Write to the Group Personnel Officer, Richardsons Westgarth & Co. Ltd., Northumberland Engine Works, Wallsend, Northumberland, quoting ref. No. H.8 D. 4645

Situations Vacant (continued)

SOUTH EASTERN ELECTRICITY BOARD

ASSISTANT DISTRICT ENGINEER, Medway District.

Salary £835 × £15 to £880 under N.J.B. Class F, Grade 8. Superannuable. The District has a considerable amount of varied industry, in addition to the domestic and commercial loads. Candidates should preferably hold the Higher National Certificate or equivalent, and practical experience in the operation, maintenance and construction of 11-kV and medium-voltage underground and overhead systems. Knowledge of the preparation of extension and reinforcement schemes an advantage.

Applications, naming 2 referees, to Medway District Manager, SEEBOARD, Gardiner St., Gillingham, Kent, by 17th September, 1958.

ASSISTANT DISTRICT ENGINEER, Medway District.

Salary £685 × £15 to £730 under N.J.B. Class F, Grade 11. The post, which is superannuable, is in a District with a considerable variety of industry in addition to domestic and commercial loads. Preference will be given to applicants holding the Higher National Certificate and having practical experience in planning, construction and maintenance of A.C. systems up to and including 11 kV.

Applications, naming 2 referees, to Medway District Manager, SEEBOARD, Gardiner St., Gillingham, Kent, by 17th September, 1958.

GEORGE WRAY,
Secretary. 4696

SALES AND CONTRACTS ENGINEERS
METERS, RELAYS AND INSTRUMENTS

ENGLISH ELECTRIC
STAFFORD

THE company wishes to appoint a number of young engineers having an interest in commercial engineering works at the Stafford Works Meter, Relay or Instrument Sales Department. As and when vacancies occur there will be opportunities for later transfer to the staff of the company's branch offices at home and abroad providing sales and technical advisory service to customers.

Applicants should have obtained or be in process of securing their H.N.C. (E.) or equivalent qualification.

Please write to

Dept. C.P.S.,
Marconi House, Strand,
London, W.C.2.

Quoting reference ER.1212S.

4707

BICC

ELECTRICAL ENGINEER required for the Systems Engineering Department in the Power Cables Division at Erith Works.

Duties will include power cables design and the preparation of super tension and pressure type cable schemes for tendering purposes. Minimum qualifications are a Degree or H.N.C. in Electrical Engineering, and previous experience in the power cable field will be considered an advantage.

The ability to write clear and concise reports will be expected of candidates, and applications are called for from men in the 25/35 age group, and for the higher ages a salary in the four-figure range will be offered with excellent prospects for the required type of man with suitable knowledge and initiative. The position will finally carry permanent staff status with pension fund facilities, and under normal circumstances a five-day week is worked with generous holidays plus the usual staff amenities.

Applications should be made in writing to BICC Ltd., Erith Works Personnel Officer, Belvedere, Kent, and only copies of references should be enclosed. 4673

SOUTH WESTERN ELECTRICITY BOARD

Second Assistant District Engineer (Planning)
Bath District

APPLICATIONS are invited from suitably qualified and experienced persons for the above appointment.

Salary according to Class F, Grade 7, £885 × £15 to £930 per annum of the N.J.B. agreement.

The successful candidate will be required to assist in the planning, research and technical work of a large distribution system up to and including 33 kV, together with the preparation of capital applications and estimates.

The person appointed will be required to undertake standby duties and will be appointed a senior authorised person.

A sound knowledge of construction methods and of all types of plant and equipment is necessary.

Corporate Membership of the Institution of Electrical Engineers or equivalent qualification is essential, and the possession of a current driving licence is desirable.

Applications to be made on official form obtainable by postcard only from District Manager, South Western Electricity Board, The Old Bridge, Bath. Closing date for receipt of completed applications is 16th September, 1958. 4694

TRANSFORMER DESIGN

ENGLISH ELECTRIC
STAFFORD

THERE are openings in the company's heavy transformer design group for designers to deal with power transformers rectifier transformers, chokes and reactors.

Design experience in this field is essential for the more senior appointments though we are also interested in younger engineers of degree standard or with their H.N.C., who have the necessary potential.

Please write giving full details to

Central Personnel Services

Marconi House
Strand, London, W.C.2
quoting reference ER.1202E.

4708

TECHNICIANS

required by
THE ATOMIC WEAPONS RESEARCH ESTABLISHMENT, ALDERMASTON, BERKSHIRE,
for duty at Orfordness, Suffolk.

To be a member of a team engaged on complex field trials involving the use of telemetry devices. Duties will include the operation and maintenance of a wide range of radio, radar and electronic instruments and equipment.

Attendance at overseas trials will be required from time to time on a rotational basis.

Opportunities may occur for some officers to work on the development and production of "one off" experimental devices and equipment.

A recognised apprenticeship or equivalent training in electronics is essential. Previous experience in field trials or in the technical branches of the fighting services as well as several years' experience in electronics an advantage.

SALARY £755 (at age 28) to £875 p.a.

Contributory superannuation scheme. A house or assistance towards legal expenses on house purchase will be available for married officers living beyond daily travelling distance.

POSTCARDS for application forms to the Senior Recruitment Officer at A.W.R.E., Aldermaston, Berks. Please quote ref. 1976/48. 4643

SOUTH WESTERN ELECTRICITY BOARD

Senior Assistant Engineer (Commercial)
Bristol Group

APPLICATIONS are invited from suitably qualified and experienced persons for the above appointment.

Salary according to Class AX, Grade 3, £1,330 × £25 to £1,455 per annum of the N.J.B. agreement, with further progression to £1,525 (Class CX).

The successful candidate will be responsible to and be required to deputise for the group commercial officer and to undertake duties embracing all aspects of commercial work. He will be particularly engaged on industrial, commercial and domestic load development problems, the implementation of appropriate campaigns to develop particular loads or increased sales of selected apparatus, and also the application of tariffs and special agreements.

Applicants must have had extensive commercial experience and an appropriate technical qualification is desirable.

Applications to be made on official form obtainable by postcard only from Group Administrative Officer, South Western Electricity Board, Electricity House, Colston Avenue, Bristol, closing date for receipt of completed applications is 16th September, 1958. 4695

CENTRAL ELECTRICITY GENERATING BOARD

North West, Merseyside & North Wales Region

APPLICATIONS are invited from suitably qualified engineers for the appointment of

GENERATION ENGINEER

at the Regional Headquarters, Didsbury.

The successful candidate will be responsible for testing and efficiency, chemical services and the general administration of the department covering monitoring and budgets, maintenance, coal purchasing, ash disposal and transport.

The salary will be within the range

£2,700 - £2,900 per annum

in accordance with Class D, Grade 8 of the National Joint Managerial and Higher Executive Grades Committee Schedule.

Applications in writing, quoting Vacancy No. E.8/329/R, should be sent to the Director of Labour and Welfare, Central Electricity Generating Board, North West, Merseyside and North Wales Region, 825, Wilmslow Road, East Didsbury, Manchester, 20, by 15th September, 1958.

4660

PATENT OFFICE: EXAMINERS
(Men and Women)

for scientific, technical and legal work on Patent applications. Age between 21 and 35; extension for regular Forces service and Overseas Civil Service.

Qualifications: normally first or second class honours degree in physics, chemistry, engineering, metallurgy or mathematics, or equivalent attainment, or professional qualification, e.g., A.M.I.C.E., A.M.I.Mech.E., A.M.I.E.E., or A.R.I.C.

London salary (men) £635-£1,410; provision for starting pay above minimum. Good promotion prospects.

Apply Civil Service Commission, 30, Old Burlington Street, London, W.1, for application form, quoting S128/58, and stating date of birth. 4688

SENIOR DESIGN DRAUGHTSMAN

MORPHY-RICHARDS LTD., St. Mary Cray, Kent, have a vacancy in the Development Department concerned with original design. Age 30 or over, experience in light engineering and/or domestic appliance field essential, H.N.C. standard preferred. This appointment offers a good salary in addition to annual profit sharing bonus. The factory is close to St. Mary Cray Station, which is easily reached from Victoria or Holborn Viaduct. Evening interviews if preferred.

Please write or telephone P. D. Nunn, Orpington 27000. 4703

ASSISTANT INSPECTORS/INSPECTORS OF WORKS (ELECTRICAL)

required by the UGANDA GOVERNMENT Public Works Department either on probation with prospects of pensionable employment or on contract for one tour of 30-36 months in first instance with provident fund benefits. Salary according to experience in scale (including inducement pay) £813 rising to £1,341 a year. Outfit allowance £30. Free passages. Liberal leave on full salary.

Candidates should be between 29-40 years of age and possess O.N.C. (Electrical) or equivalent. They should have served a full apprenticeship and subsequently have had at least five years' practical experience in the maintenance of industrial electrical equipment, machinery and large electrical installations. They must be fully conversant with U.K. Home Office Electricity Rules, the Electricity Regulations under the Factories Act, and those of the Electrical Commissioners. They should have had experience in organising works programmes and in controlling subordinate staff, materials and funds. Experience with large electrical contracting firms and/or Government works an advantage.

Write to the Crown Agents, 4, Millbank, London, S.W.1. State age, name in block letters, full qualifications and experience, and quote M2C/50272/EF. 4672

ASSISTANT WORKS ELECTRICAL ENGINEER

is required in the Tubeworks of

STEWARTS AND LLOYDS LIMITED
CORBY, NORTHANTS

Applicants must have served an approved apprenticeship with one of the larger electrical manufacturers, and should have had works test and outside construction experience, together with experience of electrical operation and maintenance and control of labour in a large works. Experience in H.T. A.C. and D.C. motors and composite gear is essential. Technical training to at least Higher National Certificate standard is desirable.

Housing conditions in the Corby area are favourable.

Applications, giving full details of qualifications and experience, should be sent to :—

Manager/Personnel
STEWARTS AND LLOYDS LIMITED
Corby, Northants

4666

CENTRAL ELECTRICITY GENERATING BOARD

Midlands Division

ASSISTANT SHIFT CHARGE ENGINEER is required at Hams Hall "C" Power Station, Lea Marston, Sutton Coldfield. N.J.B. service conditions, superannuable appointment, salary within Schedule A of the Agreement, Grade K.8, £1,065-£1,140 per annum, plus 10% for shift duties.

Applicants should have received a sound technical training and practical experience in the operation and maintenance of steam generating plant and main switchgear; knowledge of P.F. firing is desirable. Appropriate technical qualifications will be an advantage.

Apply, quoting Vacancy No. 853MD, on Form AE6, available from the Establishments Officer, 53, Wake Green Road, Moseley, Birmingham, 13, by 18th September, 1958. 4659

The Metal Industries Group of Companies

IGRANIC ELECTRIC CO. LTD.

a subsidiary company of the group, has vacancies for motor control gear designers in their engineering department. Knowledge of motor characteristics is essential. Although degree or H.N.C. preferred, applications from men with suitable experience but lacking these qualifications will be considered.

Apply in confidence with full particulars to—THE PERSONNEL OFFICER, Igranic Electric Co. Ltd., Bedford. 4702

EAST MIDLANDS ELECTRICITY BOARD

Fourth Assistant District Engineer, Coventry and District Sub-Area

APPLICATIONS are invited for an appointment as FOURTH ASSISTANT DISTRICT ENGINEER in the Coventry and District Sub-Area.

Candidates should preferably possess technical qualifications equivalent to the Higher National Certificate in Electrical Engineering and have some experience in the general work of a mains department.

The ability to drive a motor vehicle and the possession of a current driving licence will be an advantage.

The salary and conditions of the appointment will be in accordance with the National Joint Board Agreement, Class F, Grade 13 (£590 × £15 to £635 per annum).

Applications, giving details of age, education, qualifications, present position and previous experience, should be forwarded to the Manager, Coventry and District Sub-Area, Sandy Lane, Coventry, so as to reach him within three weeks of the date of this advertisement. 4698

JOSEPH LUCAS
(ELECTRICAL) LIMITED

Great King Street, Birmingham, 19

ENGINEER

EXPANSION of development of ignition equipment for gas turbines and allied projects creates a vacancy for a practical engineer with experience of design for economic production of electrical apparatus. The work is of a high technical standard and applicants should preferably possess an honours degree.

The post is permanent and pensionable and offers considerable scope for advancement to a progressive engineer.

Apply in writing stating age, qualifications and experience to the Personnel Manager, Joseph Lucas (Electrical) Ltd., Great King Street, Birmingham, 19, quoting reference PM/D/190.

128

JOSEPH LUCAS (ELECTRICAL) LIMITED

ASSISTANT ELECTRICAL DESIGN ENGINEER

required for the design of rotating electrical machines and electro-magnetic devices. Projects will include fundamental design investigations, and full scope will be given for initiative and imagination.

The post is permanent and pensionable.

Apply in writing stating age, qualifications and experience to the Personnel Manager, Joseph Lucas (Electrical) Limited, Great King Street, Birmingham, 19, quoting reference PM/D/221.

125

BIRMINGHAM REGIONAL HOSPITAL BOARD

ASSISTANT ENGINEER (Electrical). Salary £700-£1,015. Starting salary according to age, experience and qualifications. Applicants should be Graduate I.E.E. or hold other approved technical qualifications and have electrical utilisation and drawing office experience. Duties include site surveys, preparation of plans and specifications for electrical services and supervision of new works in hospital premises. Superannuable.

Apply, stating age, qualifications and experience (with dates) and present post, to Secretary, 10, Augustus Road, Birmingham, 15, by 22nd September. 4675

CENTRAL ELECTRICITY GENERATING BOARD

South Wales Division
Vacancy No. 86/ER/58

APPLICATIONS invited for superannuable N.J.B. appointment of ASSISTANT ENGINEER (Combustion), UPPER BOAT POWER STATION, near PONTYPRIDD.

Salary H.9, £885-£930 per annum.

Applicants should possess H.N.C. or equivalent qualifications. Previous experience of the economical operation of turbines, pulverised fuel and stoker-fired boilers desirable. Experience of boiler instrumentation an advantage.

Special application forms obtainable from Secretary, South Wales Division, Central Electricity Generating Board, Twyn-y-fedwen Road, Gabalfa, Cardiff, to be returned by 18th September, 1958. 4674

MIDLANDS ELECTRICITY BOARD

THIRD ASSISTANT DISTRICT COMMERCIAL ENGINEER required in the Banbury District of the Worcester and District Sub-Area.

Applicants should have experience in the preparation of estimates, interviewing consumers, and the supervision of contracting work. A knowledge of street lighting is desirable.

Salary £685/£730 per annum (N.J.B. Grade E.10).

Apply by letter, within 14 days, stating age, experience, present salary and position to Mr. R. Mallet, Sub-Area Manager, Midlands Electricity Board, Whittington, Worcester.

A. STEPHENS,
Secretary.
4692

HEAD WRIGHTSON IRON & STEEL WORKS ENGINEERING LTD.

require ELECTRICAL DRAUGHTSMEN, senior and junior, for the layout and design of industrial installations comprising power distribution, motor applications, lighting, and allied design work. Experience of iron and steel works practice an advantage but not essential. Excellent working conditions, pension scheme, assistance with house purchase.

Apply Personnel Manager, Ref. IS/1/20, Teesdale Iron Works, Thornaby-on-Tees.

4668

THE GENERAL ELECTRIC COMPANY LIMITED

Witton, Birmingham, 6

requires a young electrical engineer for work in connection with the preparation of tenders for transformers and associated gear.

Applicants should possess at least the H.N.C. (Electrical) or equivalent, with some knowledge of estimating and tendering.

This appointment is progressive and a generous salary is offered, depending on qualifications and experience.

Please write with full particulars to—
The Staff Manager

4699

A.E.R.E., HARWELL

Engineering Estimates

AN apprenticed or similarly trained technician is required to prepare cost estimates of mechanical and electrical components for the Proton Synchrotron (Particle Accelerator) and to relate contracts to estimates. H.N.C. or equivalent in Mech. or Elec. Engineering and knowledge of building construction, civil engineering, specifications for engineering plant or contract procedure desirable.

Salary £1,050-£1,270 (Technical I). Staff conditions.

Send POSTCARD for application forms and details to Group Recruitment Officer (1194/48), U.K.A.E.A., Atomic Energy Research Establishment, Didcot, Berks. 4642

***Situations Vacant** (continued)*

SALES PROMOTION MANAGER

required by established electric low voltage lamp manufacturing company near London (west) now supplying manufacturers of motor vehicles and accessories.

The position calls for marketing and sales activities in the U.K.

Applicants must have sound organising ability, be currently filling a responsible sales position and have live contacts in all classes of potential customers for this type of work.

Preferred age 30 to 40.

A remunerative salary appropriate to qualifications and experience will be paid.

Please send details in confidence, to—Box 4667.

INSTALLATION DESIGN ENGINEER

A VACANCY exists in the Research Laboratories of DECCA RADAR LIMITED for an Electrical Engineer to join a group responsible for the design of installations including power supply systems, A.C. distribution boards, etc., and the initiation of associated layouts for all types of radar installations.

The position is a senior one, carrying a starting salary commensurate with the responsibility involved.

Applications are invited from men with H.N.C. and previous experience in this field. Please send brief details to DECCA RADAR LIMITED (RLA/208), Radar Research Laboratory, Lyon Road, Walton-on-Thames, Surrey.

4644

DESIGNER-DRAUGHTSMAN

for design and development of electric wiring accessories. Good electrical training desirable and knowledge of mass production methods advantageous.

A high salary with good prospects for a senior designer with previous experience in this specialised branch of the electrical industry.

Applicants should write stating age, education, experience and salary required, and all letters will be treated in strict confidence addressed to: Ref. T.M., M.K. Electric Ltd., Wakefield Street, Edmonton, London, N.18.

4705

The Metal Industries Group of Companies

IGRANIC ELECTRIC CO. LTD.

a subsidiary company of the group, has vacancies for graduates in Physics, Engineering or Mathematics who are interested in developing and applying electrical servo mechanisms incorporating magnetic amplifiers. Knowledge of circuit analysis is essential. The salary paid will be commensurate with the ability of the successful applicants and the responsibility of the post.

Apply in confidence with full particulars to—THE PERSONNEL OFFICER, Igranic Electric Co. Ltd., Bedford. 4701

TRANSFORMER DRAUGHTSMEN

SENIOR and junior draughtsmen with experience on power transformers in range 5 to 10,000 kVA required. Permanent positions offering good salary according to experience. Pension, life assurance scheme, etc. Evening and Saturday interviews can be arranged.

Write stating age, experience and qualifications to:—

The Chief Engineer
BRYCE ELECTRIC CONSTRUCTION CO. LTD.
Kelvin Works, Hackbridge, Wallington, Surrey.
4704

CLASSIFIED ADVERTISEMENTS ARE PREPAID

CONTROL SYSTEM ENGINEERS

A PROGRESSIVE engineering company in the Birmingham area will require the services of one or two qualified engineers with experience of ELECTRONIC CONTROL SYSTEMS.

This is a completely new development project. The work will be interesting and the prospects rewarding.

Candidates are requested to write giving, in confidence, full details of their career to date.—Box 4656.

A VACANCY exists with a lighting organisation in the Home Counties for a junior lighting engineer. The applicant should have an up-to-date knowledge of modern lighting practices, and be conversant with lighting fittings design. Apply, giving full details, age, experience, etc., and salary required.—Box 9468.

AN old-established London electrical contractor has vacancy for supervising engineer to control commercial and industrial installations. Must be fully experienced in design, estimating, supervision and bills of quantities, and be able to measure and take off schedule rates. Only men with office experience need apply, stating age, nationality, complete details of training, type of works upon which engaged and salary earned over the last three years. The position will carry salary, bonus, car, and is pensionable.—Box 4683.

ASSISTANT electrical engineer with sound technical training and practical experience, a good knowledge of heavy electrical equipment, control schemes and cabling, required for large integrated iron and steel works in North Lincs. Age preferably not over 35. Reply giving full details of education, training and experience to the Chief Engineer, Appleby-Frodingham Steel Company, Scunthorpe, Lincs. 4564

ASSISTANT general manager required by Midland electrical contractors with number of branches. Must have experience of estimating, and ability to organise and control staff. State experience, previous appointments and salary required to—Box 4632.

CABLE makers (independent) require fully qualified works manager with comprehensive knowledge of electric cable making in all phases with emphasis on low tension. Possibility of employment overseas. All applications will be treated in strict confidence.—Box 4501.

CHARGEHAND and foreman electricians required for service in East Africa. Opportunity for permanency if desired. Must be experienced in all types of electrical installations. Write stating age and experience.—Box 4540.

CLERK required for electrical wholesaler. Knowledge of pricing, stock control, sales and purchase invoicing. To take charge of office. London W.3 area.—Box 9463.

CONSULTING engineers invite applications from persons aged 20-25 years for the position of junior electrical designer/draughtsman in a small office in London. The applicant, who should have had experience in electrical installation work, will be required to prepare, under supervision, schemes and specifications for electrical installations in all types of industrial and commercial buildings and assist in the inspection of projects. Salary offered in the first instance £500 × £25 to £650 and there will be scope for advancement to a higher scale. Applications giving details of age, experience and qualifications should be addressed to W. J. Perkins & Partners, 26, Victoria Street, London, S.W.1. 4706

CONTROL gear engineer required, age 23-35, for layout and circuiting of contactor equipment. Good salary. Permanent and progressive position. Canteen, pension scheme. Write stating age, experience and qualifications, if any, to Personnel Officer, Dewhurst & Partner Ltd., Inverness Road, Hounslow, Middlesex. 273

DESIGN development engineer (electrical) required by established and progressive Midland manufacturers of electrical control gear and domestic appliances. It is essential that candidates have experience in initiating new projects and seeing them through to production. Graduate, A.M.I.E.E. or equivalent qualification desirable. A very good commencing salary is offered and the position affords every prospect of advancement to a senior position in the company. Applications will be treated as confidential and should give in detail particulars of age, technical qualifications, previous posts, etc., to Personnel Manager.—Box 4678.

DESIGN draughtsman required by progressive and established company. Experience in switch fuse and/or motor control gear design, and ability to work in close collaboration with an established team essential. This is a permanent and progressive post offering excellent conditions of employment. Candidates are invited to submit, in complete confidence, full particulars of age, previous posts, experience and, where appropriate, technical qualifications to Personnel Manager, Midland Electric Manfg. Co. Ltd., Reddings Lane, Tyseley, Birmingham. 4677

DRAKE & GORHAM (CONTRACTORS) Ltd. have a vacancy for a senior estimating engineer to act as assistant to the manager of the department in London. Applicants should write, stating details of experience, age and salary expected, to—36, Grosvenor Gardens, London, S.W.1. 4602

DRAKE & GORHAM (CONTRACTORS) Ltd. have a vacancy for a senior supervising engineer to act as group leader in London. Applicants should write, stating details of experience, age and salary expected, to—36, Grosvenor Gardens, London, S.W.1. 4603

EKCO-ENSIGN ELECTRIC Ltd. require experienced lighting engineer at their Birmingham office. He should be thoroughly conversant with modern lighting practice and equipment. Apply—Senior Lighting Engineer, 45, Essex Street, Strand, London, W.C.2. 388

ELECTRICAL draughtsman. The Stanton Ironworks Company Limited, Near Nottingham, has a vacancy for an electrical draughtsman with experience in planning schemes for lighting and power distribution and preparation of wiring diagrams for motors, control gear, etc., as applied to heavy industrial practice. The post is pensionable. 5-day week. Holiday arrangements honoured. Write in confidence to the Staffing Officer, stating age, qualifications and experience. 4653

ELECTRICAL engineer draughtsman required to take charge of a small drawing office in West Hartlepool, dealing mainly with power resistors and heaters for industrial applications. Experience with motor control gear and H.N.C. in Electrical Engineering desirable, but not essential. Apply giving technical qualifications, details of experience, age and salary required, to—Box 4654.

ELECTRICAL engineer, preferably graduate, 25/30, required for technical work in connection with tenders for generating plant, switchgear and control boards. Must be able to prepare circuit diagrams relating to automatic control of engine-driven generating plant. This is an interesting technical appointment offering ample scope for ingenuity and original approach whilst providing an excellent opportunity for advancement with an expanding and progressive organisation situated in the South of England. Write quoting previous experience, technical training, age and salary required to Managing Director.—Box 4568.

ELECTRICAL engineering assistant required for large process factory in Belfast. The position requires experience in installation and maintenance of H.T. and M.T. switchgear, distribution systems and A.C. motors, starters, automatic control systems, etc. Responsibility will include supervision of the electrical section of the engineering department, preparation of schemes, estimates and drawings and the supervision of outside contractors, etc. Minimum qualifications, University degree or Graduateship I.E.E., with three years' practical experience in a supervisory position. Salary range, £950-£1,150 p.a., according to age and experience, contributory pension scheme, welfare, sickness and canteen facilities, etc., are offered by the company. Applications (which will be treated in strict confidence) should be made to—Box 4669.

ELECTRICAL engineering draughtsman required for a department giving a consulting service to a large group of factories. Applicants should have experience in distribution, control, and utilisation of electrical power. This position offers scope for advancement within the group. Applicants should be at least of Ordinary National Certificate standard. Five-day week. Pension scheme. Canteen and social club facilities. Apply—Personnel Manager, Box 4709.

ELECTRICAL test superintendent required by rubber and plastic cable makers, London area. Write stating age, experience and salary required.—Box 4710.

ELECTRICAL fitters required, 25-35 years of age, for instrument installation in connection with industrial schemes. Good remuneration for first-class men who are prepared to travel and able to control labour. Apply in writing giving full details to — Employment Officer, George Kent Ltd., Biscot Road, Luton, Beds. 4678a

ELECTRICAL wholesalers require representatives; all areas; experience in the electrical trade essential.—Universal Distributing Co. Ltd., 66/68, Great Eastern Street, London, E.C.2 (Phone, SHOreditch 8282). 4505

ENGINEER surveyor required for inspection of cranes and other lifting plant. Must have drawing office experience of design of cranes and National Certificate for Mechanical Engineering. Resident South London. Salary £735 to £1,060. E.S.A. scale. Non-contributory pension, etc. Apply, Manager, Eng. Dept., General Accident Corp., 99, Aldwych, London, W.C.2. 4658

ESTIMATING engineers, to take off quantities, are required by old-established electrical contractors for employment in their London estimating department. Applicants should write, giving details of experience, age and salary expected, to—Box 4604.

FOREMAN armature winder for repair shop. —W. H. Sugden Ltd., Glenny Rd., Barking. 4711

KEEN young draughtsman with machine shop training required for small production drawing office of company engaged in the manufacture of control gear equipment. Electromechanical experience desirable but not essential. Permanent and progressive position. 5-day week, pension scheme, canteen, etc. Apply giving full details of age and previous experience to Personnel Officer, Dewhurst & Partner Ltd., Inverness Road, Hounslow, Middx. 278

LEADING London electrical wholesaler requires two experienced assistant storekeepers. Good wages and prospects, pension scheme. Apply to — The National Electrical Supplies Co. Ltd., 240-244, King St., London, W.6 (Telephone, RIV. 4655). 4646

LONDON contractors require senior estimating engineer, familiar with all types of electrical contracting. Write giving full details of experience and salary to—Box 9466.

MANUFACTURERS of contactor motor control equipment require sales engineer in South Wales. A suitably trained young man with O.N.C. minimum technical qualifications, and with preferably, but not essentially, connections covering mainly industrial users, could make this appointment an attractive career.—Box 4591.

MOTOR control and contactor gear manufacturer in Midlands requires capable and experienced designer in M.V. range. Excellent opportunity for right man. State qualifications, salary and experience, in confidence, to—Box 4497.

PLASTIC moulding. An old-established company in this industry has a vacancy for a technical representative on its sale staff to cover London and Southern area. Previous experience not essential, but applicants must be of good education, personality, with ambition for this type of career, and have had some drawing office and technical training, particularly in electrical engineering. The successful candidate would be required to undergo a period of works training before commencing outside duties. Write stating age, details of past and present occupation and salary expected to—Box 4712.

REPRESENTATIVE required for E.W.F. wholesalers to take over established connection West London area. Must have knowledge of the trade but previous travelling experience not necessary; well paid position with good prospects. Reply in confidence with full details of experience, etc., to Managing Director. —Box 4635.

SALES engineer (outside) required by electrical distribution gear specialists for Midlands. Car provided. Salary and expenses. Pension scheme. Write stating age, technical qualifications, experience and salary required.—Box 4713.

SALES office manager required. Salary commensurate with experience. To take full control of sales office engaged in street lighting. Previous experience in street lighting industry essential. Pension scheme optional. Apply in writing giving personal history to the Managing Director, Concrete Utilities Limited, Ware, Herts. 4679

SALES engineer (senior) required by electrical distribution gear specialists, Birmingham area. Inside duties, D.O. experience desirable. Pension scheme. Write stating age, technical qualifications, experience and salary required.—Box 4715.

SERVICE manager. The General Electric Co. Ltd. require a service manager who will have responsibility for the after-sales service of the complete range of G.E.C. domestic equipment throughout the U.K. This is a new and senior post for a man with first-class administrative and organising ability and preferably with previous experience in a similar appointment concerned with the service of electrical or other equipment. Works experience and knowledge of customer relations are desirable. Drive, determination and a sense of urgency are essential. Apply in writing to the Staff Manager, G.E.C., Magnet House, Kingsway, London, W.C.2, giving full details of age and experience. 4680

SUPERVISING engineer required by electrical contractors for the Midland area. Fully experienced all systems. State age, experience and salary required.—Box 4631.

SUPERVISING engineers are required by large electrical contractors to undertake supervision of contract work, operating from London. Applicants should write, stating full details of experience, enclosing copies of any references available, giving age and salary expected, to—Box 4605.

TECHNICAL sales engineer (outside) required by Midland electrical distribution gear specialists. Prepared to travel whole country. Car provided. Salary and expenses. Pension scheme. Write stating age, technical qualifications, experience and salary required.—Box 4714.

THE TELEGRAPH CONSTRUCTION & MAINTENANCE Co. Ltd. require a salesman having experience and successful connections with users of paper and plastic cables. Applicants should have enthusiasm and drive, and an attractive salary, car and good prospects will be offered. The area of operation will be North London - East Anglia. Applications should be sent to—The Home Sales Manager, T.C.M. Co. Ltd., Mercury House, Theobald's Road, London, W.C.1. 4647

APPOINTMENTS FILLED

Dissatisfaction having so often been expressed that unsuccessful applicants are left in ignorance of the fact that the position applied for has been filled, may we suggest that Advertisers notify us to that effect when they have arrived at a decision? We will then insert a notice free of charge under this heading.

SITUATIONS WANTED

ARE you seeking a first-class power engineer, electrical and mechanical? Experienced design, construction, operation, maintenance and 8 years' highly successful management, including contract negotiations. M.I.E.E., M.I.I.E., 45; returned abroad. Now available for London or Southern Counties.—Box 4681.

B.Sc., A.M.I.E.E. (33), works engineering background, technical, technical sales and commercial managerial experience in medium engineering, invites proposals.—Box 9465.

ELECTRICAL installation engineer. Graduate I.E.E. Proved administrative and practical experience. Wiring expert. Can obtain results. London area.—Box 9458.

EXECUTIVE engineer, light electro-mechanical, requires post, preferably near South Coast, where 36 years' comprehensive experience design production and management can be put to good use. Interesting work preferred to high salary.—Box 9453.

FURNACES, electric. Design engineer desires change. Project to product. Batch, continuous, automatic, atmosphere, forced air circulated, etc. 25 yrs.' exp.—Box 9454.

SALESMAN, many years' experience selling electrical appliances, E.D.A. cert., own car, now living Torquay area Devon, seeks position as sales representative. Replies to—Box 9450.

ARTICLES FOR SALE

HOUSE SERVICE METERS

200-240-v. A.C. or D.C., 10 amps. capacity, quarterly type, from 25s. each, plus 2s. 6d. carr.

UNIVERSAL ELECTRICAL CO.
221, City Road, London, E.C.1 37

NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD

Aberdeen Area

Surplus Plant Disposal

THE Board has for disposal certain H.V. and M.V. switchgear and offers are invited for the purchase of this either as plant or as scrap.

Full details, tender forms, conditions of acceptance and permission to view may be obtained from the undersigned with whom offers, in a sealed envelope marked Scrap Tender No. 83/17/9, should be lodged not later than first post on Wednesday, 17th September, 1958.

J. E. WHITTAKER,
Millburn Street, Area Manager.
Aberdeen. 4670

ROLLING MILL MOTORS

FOUR 400-h.p. Rolling Mill Slipring Motors by E.E.C. wound for 415/3/50, 738 r.p.m., coupled to gearbox by POWER PLANT Co., final speed 30 r.p.m., high-speed shaft with two flywheels, total kinetic energy 10,000 h.p. seconds. 30-h.p. barring motor and automatic IGRANIC control gear with slip-resistance.

750-h.p. Rolling Mill Motor by BROWN BOVERI, date 1954; 2,200/3/50, 146 r.p.m.

GEORGE COHEN SONS & CO. LTD.
Wood Lane, London, W.12.
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Stanningley, Nr. Leeds.
(Tel.: Pudsey 2241). 4657

VARIABLE SPEED DRIVES, 400/440/3/50

H.P.	Make.	Type.	Speed Range.
270	B.T.H.	Schrage	370/95
0/225	Harland	Ward L'd	0/1750
0/200	G.E.C.	Ward L'd	0/1000
170/27.5	B.T.H.	Schrage	1000/400
0/150	Mather & Platt	Ward L'd	0/460
0/33/33	Mawdsley	Ward L'd	0/1000/1450

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PREPAYMENT and credit, 200/250 v. A.C., 1/p., 50 c., 2½-100 A. Fixed or variable tariff. Reconditioned, fully tested and guaranteed 2 years. Prompt delivery, carriage paid.

ALBERICE METER COMPANY
Fairfax Works, Fairfax Rd., London, N.8
(Tel. MOUntview 7944, 6373) 191

A.A. ELECTRICAL Co. for A.C.-D.C. motors, switchgear, exhaust fans, hoists, reduction gears, new or reconditioned units.—CHI. 5105. 67, Rothschild Rd., London W.4. 57

BABCOCK & Wilcox water tube boiler will cut down your fuel costs; we can supply from stock. Two 40,000 lb. evap., 220 lb. w.p.; one 25,000 lb. evap., 200 lb. w.p.; 3,000 lb. evap., 400 lb. w.p.; Spencer Bonecourt boiler; also Marine, Cornish vertical, etc.—Burford, Taylor & Co. Ltd., Boiler Specialists, Burtayco House, Church Street, Middlesbrough (Tel. Middlesbrough 2622). 122

A.C. and D.C. motors, generators, from stock.—Service Electric Co. Ltd., Honeypot Lane, Stanmore, Middx. (Edgware 5566/9). 91

A.C. and D.C. 1/- slotmeters. Guaranteed 2 years, 2½-50 amps. From 50/-. Repairs and recalibrations. See Billiard: Tradex Meter Co., Surbiton (Tel. Elmbridge 4487). 169

ALTERNATORS from ½ to 675 kVA in stock, single and three-phase, all voltages and frequencies. Guaranteed. Many unused. Send your requirements.—Fyfe, Wilson & Co. Ltd., Station Works, Bishop's Stortford. 162

ALTERNATORS, generators, 1-100 kVA, all voltages. Specialists—Powerco Ltd., 312, York Rd., London, S.W.18 (VAN. 5234). 147

ALTERNATORS, 3-phase, all sizes in stock from 7 kVA up to 330 kVA.—Britannia Manufacturing Co. Ltd., 20/26, Britannia Walk, London, N.1 (CLErkenwell 5512). 24

BARGAINS in electric motors from A. Cooksley & Co. Ltd., 21/25, Tabernacle Street, London, E.C.2. Ring Monarch 3355. 50

Articles for Sale (continued)

BILLIARD Meters. 1/-, 6d. or 1d. slot. All time settings. From 140/-. See Quarterly.—Tradex, Surbiton. 170

CABLE, underground, all types ex stock.—E. M. Tatton Co. Ltd., Kew Bridge, Brentford (EALing 3155/6). 117

CABLE, underground, PILC/VIR/LC, ex London stock. Cutting orders same day delivery London area. Send for priced stock lists. — Batt Electrical Co., 6, Dock Street, London, E.1 (Tel. ROYal 5905). 316

CIRCUIT breakers, various sizes in stock, A.C. and D.C., 200 amperes up to 2,000 amperes. Also dynamo and alternator switchboards. — Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 26

CONVERTERS and motor-alternators, 24, 110 and 220 v. D.C. to 230/1/50 A.C., 125 watts to 6 kVA in stock.—Powerco Ltd., 312, York Rd., London, S.W.18 (VAN. 5234). 150

CRANE motors. Direct current, series wound or compound wound, all voltages. We have large stocks.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 22

DIESEL generating sets, all sizes to 500 kW. Britannia Mfg. Co. Ltd., Britannia Walk, London, N.1. 16

ELECTRIC lamps (surplus, Mazda, etc.), 15, 25, 40, 60 w., 9d. Mercury, auto and torch bulbs at very low prices. Lists on request. —Suplex Lamps Ltd., 239, High Holborn, London, W.C.1 (Tel. HOL. 0225, 4543). 4606

ELECTRIC motors, dynamos, alternators and motor generator sets of all sizes. We hold one of the largest stocks in England. New and reconditioned, with 12 months' guarantee.—Britannia Manufacturing Co. Ltd., Britannia Walk, London, N.1 (Clerkenwell 5512, 3 lines); also Works and Stores, Chobham, Surrey. 20

ELECTRIC motors, generators, control gear, transformers, A.C. and D.C., new and reconditioned; all covered with our usual 12 months' guarantee; large stocks available.—Electropower Co. Ltd., Kingsbury Works, Kingsbury Road, London, N.W.9 (Colindale 4621-2). 42

ELECTRIC motors, generators, motor generator sets, transformers, switchgear, etc., large comprehensive stock, overhauled and guaranteed. Copy of our Register, "Electrical Surplus," containing thousands of items of electrical plant, sent on request.—R. F. Winder Ltd., Belgrave Electrical Works, Leeds, 2. 54

ELECTRICIANS. Send for details Shaftesbury lightweight "Bantam" ladders. Top sections fitted with patent moulded rubber blocks, eliminate possibility of scratching or marking walls, fascias, and other painted or highly polished surfaces. Also available for immediate delivery, steps, platform steps, trestles, telescopic trestles, pole and builders-type ladders, and all sizes of two and three-section extension ladders.—Shaftesbury Ladders Ltd. (E.R.), 453, Katherine Road, London, E.7 (Phone: Grangewood 3363/4). 111

FLOODLIGHTS. 50 Simplex L.S.55 weatherproof, 500/1,500-watt, swivel-mounted, £7 10s. each. 12 shovel fittings, weatherproof, 500/1,500-watt, pole mounting, £7 10s. each. 50 Simplex L.S.61 weatherproof, 200-watt swivel-mounted, £3 each. 150 Maxlume 200-watt weatherproof swivel-mounted, £2 each. — Leighton Warehouse Co. Ltd., 6, Church Road, Linslade, Leighton Buzzard (Tel. No. L.B. 3400). 9449

FLUORESCENT fittings, lamps, starters and control gear for home and export. Fully guaranteed by actual manufacturers. Send for catalogues.— The Anglo-American Electrical Company, Olive Street, Bury, Lancs. 245

FLUORESCENT tubes reconditioned and guaranteed as new for 7s. 6d. each. Free collection and delivery in Lancs and Yorks.— The Anglo-American Electrical Company, Bury New Road, Breightmet, Bolton, Lancs. (Telephone, Bolton 7251). 212

FOR sale, Ward Leonard sets in a great range of outputs, speeds and control systems.—Fyfe, Wilson & Co. Ltd., Station Works, Bishop's Stortford. 161

FREQUENCY changers and variable frequency M/A sets in stock, and to specification.—Powerco Ltd., 312, York Rd., London, S.W.18 (VAN. 5234). 148

GENERATING plants of all types, new and reconditioned up to 100 kVA in stock. Special plants built to order at short notice; automatic mains failure, etc. — Powerco Ltd., 312, York Rd., London S.W.18 (VAN. 5234). 151

GENERATING sets for sale, petrol, diesel and steam, from 1 kW up to 700 kW, A.C. and D.C. switchboards.—Fyfe, Wilson & Co. Ltd., Station Works, Bishop's Stortford. 163

HIGH frequency alternators and converters, 400 to 2,600 cycles up to 6 kVA in stock. Powerco Ltd., 312, York Rd., London, S.W.18 (VAN. 5234). 149

LABELS, dials, engraved in any material, for switchgear, instrument panels, etc. Customers' own material also engraved.—Jackman Court, Ltd., 86a, South Street, Dorking. (Tel. 4698). 9462

MOTOR generator sets and converters, all sizes and voltages from ½ kW up to 500 kW in stock. — Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, City Road, London, N.1 (Tel. Clerkenwell 5512, 5513 & 5514). 12

MOTOR generators of all types in stock and to specification up to approx. 100 kW.—Powerco Ltd., 312, York Rd., London, S.W.18 (VAN. 5234). 152

MOTORS, starters, circuit breakers. Huge stocks of all types, ¼ to 300 h.p. Stock list or quote by return.—J. S. Ramsbottom & Co. Ltd., Bow St., Keighley (3774-5-6). 70

NAMEPLATES, engraving, diesinking, stencils. — Stilwell & Sons Ltd., 153, Far Gosford Street, Coventry. 108

NEW welding cables ex stock at competitive prices.—E. M. Tatton & Co. Ltd., Kew Bridge, Brentford (EALing 3155). 4509

ONE Paxman-Ricardo diesel alternator set, comprising one 400-h.p., 1,000-r.p.m. Paxman diesel engine complete with electric starter, fuel and cooling tanks; Heenan & Froude cooler; and misc. engine spares. One Crompton-Parkinson 440-v., 3-phase, 50-cycle, 330-kVA alternator with exciter. Control panel and Crompton O.C.B. Condition of the above equipment as new. Inspection invited. Price around £4,000.—Box 4671.

PHASE converters, single to three-phase, several sizes in stock up to 90 h.p., 3-phase loading. — Britannia Mfg. Co. Ltd., Britannia Walk, London, N.1. 29

PLATING dynamos and motor generator sets, various sizes from 500 amps. up to 2,000 amps., with A.C. and D.C. motors.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 15

POLYPHASE kilowatt hour meters. Available from stock.—Universal Electrical, 221, City Road, London, E.C.1. 40

PREPAYMENT 1s. slot house service meters. —Universal Electrical, 217-221, City Road, London, E.C.1. 36

PURLEY chokes and ballasts. Our 80-w. tapped h.p.f. ballast with starter switch-holder incorporated is proving itself the most popular unit. Suitable for most fittings, 57s. 6d. each subject. — F. F. Blanshard Ltd. (Dept. ER). Purley, Surrey (Uplands 4818/9). 52

QUARTERLY Credit Meters, single & poly-phase, 2½-100 amps. From 17/6d. Also D.C. See Television.—Tradex, Surbiton. 171

ROTARY converters in stock, all sizes; enquiries invited. — Universal Electrical, 221, City Road, London, E.C.1. 34

SECONDHAND electrical plant can be as good as new if you buy it from specialists. Write for our stock list.— Dynamo & Motor Repairs Ltd., North End Road, Wembley Park, Middlesex (Telephone, Wembley 3121); Soho Road, Handsworth, Birmingham (Telephone, Birmingham Northern 0898). 73

SMALL BR screws and nuts in steel, brass and stainless steel, from stock.—Premier Screws & Repetition Co. Ltd., Woodgate, Leicester. 180

SLYDLOK fuses for sale.—Ryness Supplies, 37, Goodge Street, London, W.1. 284

TELEVISION slotmeters and time switches. Details from: Tradex Meter Co., Surbiton. Elmbridge 4487. 172

VENNER time switches, 200-240 v. A.C./D.C., 10-50 amps., from stock.—Universal Electrical Co., 221, City Rd., London, E.C.1. 38

WARD Leonard motor generating sets, all sizes.—Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, London, N.1 (Tel. Clerkenwell 5512). 10

200-kW mercury arc rectifier by Hewittic for 400 volts, 3-phase supply and with 3-wire D.C. output 400 or 200 volts. Three-bulb unit.—Thomas Mitchell & Sons Limited, Bolton. 4637

400-cycle to 1,500-cycle motor alternators and alternators.—Britannia Mfg. Co. Ltd., Britannia Walk, London, N.1. 27

SALES BY AUCTION

Thirty-fourth Sale **E. R.**

By Order of the Secretary of State for Air

No. 25 MAINTENANCE UNIT, ROYAL AIR FORCE, HARTLEBURY, WORCESTERSHIRE
(4 miles from Kidderminster, 11 miles from Worcester.)

NOCK & JOSELAND

are instructed to Sell by Auction at the above Unit on

THURSDAY, 18th SEPTEMBER, 1958, at 11 a.m. prompt,

a Large Quantity of Valuable

MISCELLANEOUS STORES

including Clothing and Equipment, Footwear, Parachutes and Dinghies, Cameras, Bromide Paper, etc., RADIO AND ELECTRICAL EQUIPMENT, General Stores.

VIEWING: The Lots are on view at Hartlebury on Wednesday, 17th September, 1958, between the hours of 9 a.m. and 4 p.m., and on the morning of the Sale Day between the hours of 8 a.m. and 11 a.m.

Admission only on production of Catalogue, which will admit two persons on the View Day and one person on the Sale Day. The Secretary of State for Air reserves the right to refuse admission. Catalogues, price ONE SHILLING EACH (Postal Orders, not stamps), can be obtained from the Auctioneers:—

NOCK & JOSELAND
Bank Buildings, Kidderminster
(Tel. 2053 & 4211) 4648

EQUIPMENT FOR HIRE

GENERATING set hire service. Consult the most experienced firm for A.C. and D.C. units from 2 kW to 240 kW, diesel or petrol, stationary or mobile, sale or hire. 24-hr. breakdown service. — Dawson-Keith Ltd., Hillview Rd., Sutton, Surrey (Fairlands 4401). 46

RELIABLE, self-contained diesel electric generating sets for hire, 2.5 to 260 kW. Night and day maintenance service. Quotations by return. — Whitetrade Limited, Rochester, Kent (Tel. Chatham 41133, 3 lines). 294

ARTICLES WANTED

HARRINGTON & Sons, reclamation contractors, want redundant A.C./D.C. electric motors and transformers, stocks of cable, etc.—109, Beaconsfield Street, New Beckton, East Ham, London, E.6 (ALB. 1388). 315

MERCURY (Quicksilver) wanted. Write for packing instructions. Gold, silver and platinum also purchased.—Collingridge & Co. Ltd., Riverside Works, Riverside Rd., Watford (Tel. 5963). 114

ONE indoor transformer wanted, 11,000 kVA, 3-phase, 50 cycles.—Electro Heat Treatments Ltd., West Bromwich. 4682

QUICKSILVER & beryllium copper urgently required for best prices and prompt cash.—Sterling Products Ltd. (Ealing 9248). 293

SURPLUS laminations, enamel copper wire, screws, nuts, flex. Good prices paid. Full details to—Box 199.

WANTED, D.C. and A.C. ball-bearing motors, motor generator sets, dynamos and alternators. Full details to—Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, London, N.1. 13

WANTED for prompt cash, ferrous and non-ferrous scrap, also plant for dismantling. Buyers of secondhand machinery and plant for re-use.—W. & H. Cooper Ltd., 176, Brady St., Bethnal Green, London, E.1. 120

WANTED, rotary converters, any sizes.—Universal, 221 City Rd., London E.C.1. 35

WANTED, surplus stock cable, all types and sizes. We can inspect.—Box 220.

AGENCIES

SALES AGENTS REQUIRED

BY ELECTRIC LAMP AND INDUSTRIAL FITTINGS MANUFACTURERS. Areas available in the Midlands, Home Counties, Yorkshire, Lancashire and Scotland. Applicants must have first-class connections with industry and electrical trade. Only well-established firms or individuals considered. For full details write—Box 4684.

AGENTS required in all areas calling on Electricity Boards and Coal Boards, also large electrical manufacturers, for various specialised earthing devices, cable sockets and glands. Full details to—Box 4650.

CANADIAN company in cable identification and associated lines, providing full coverage in largest manufacturing centres in Canada, would be willing to consider additional lines of British manufacture. Full particulars of financial structure furnished upon request.—Box 9464.

CONDUIT fittings. Agent required with wholesale connections in the North Riding of Yorkshire, particularly in the Newcastle-on-Tyne and Middlesbrough area. Please give full details as to agencies held and ground covered.—Box 9469.

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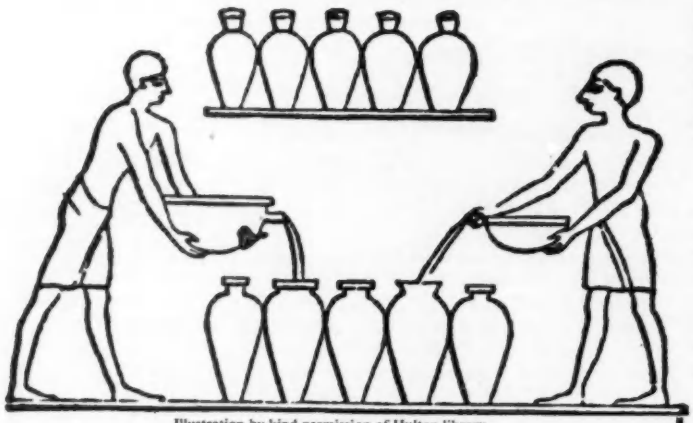

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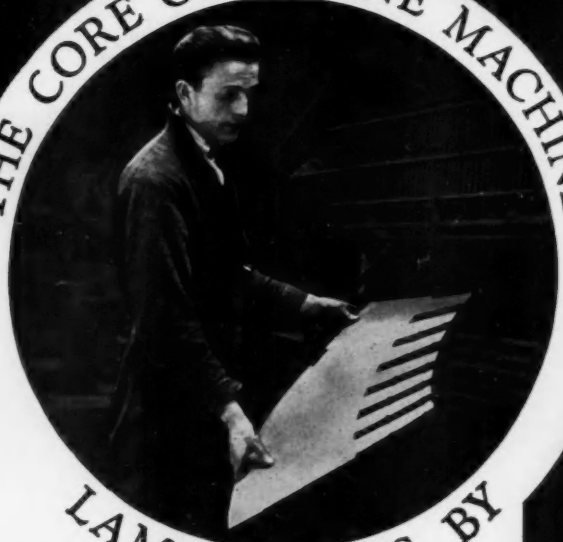

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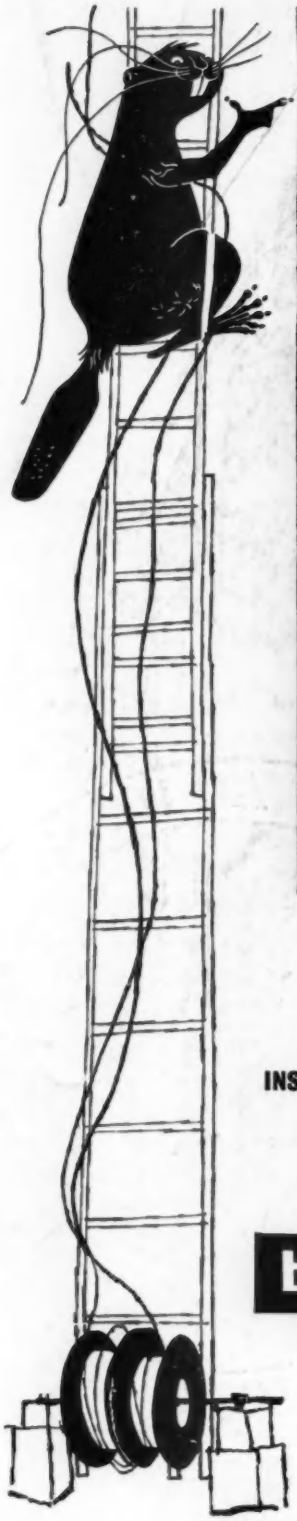

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